3 GREAT NEW ORLEANS CLONE RECIPES F0R MARDI GRAS

Brew YOUR

JANUARY-FEBRUARY 2004, VOL.10, NO.1

THE HOW-TO HOMEBR MAG

got stout?

tips and recipes for brewing on the dark side

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Volume 10 Number 1

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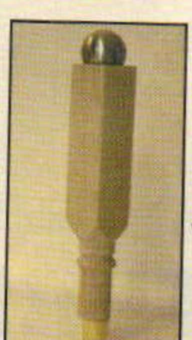

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Brew YOUR OWN

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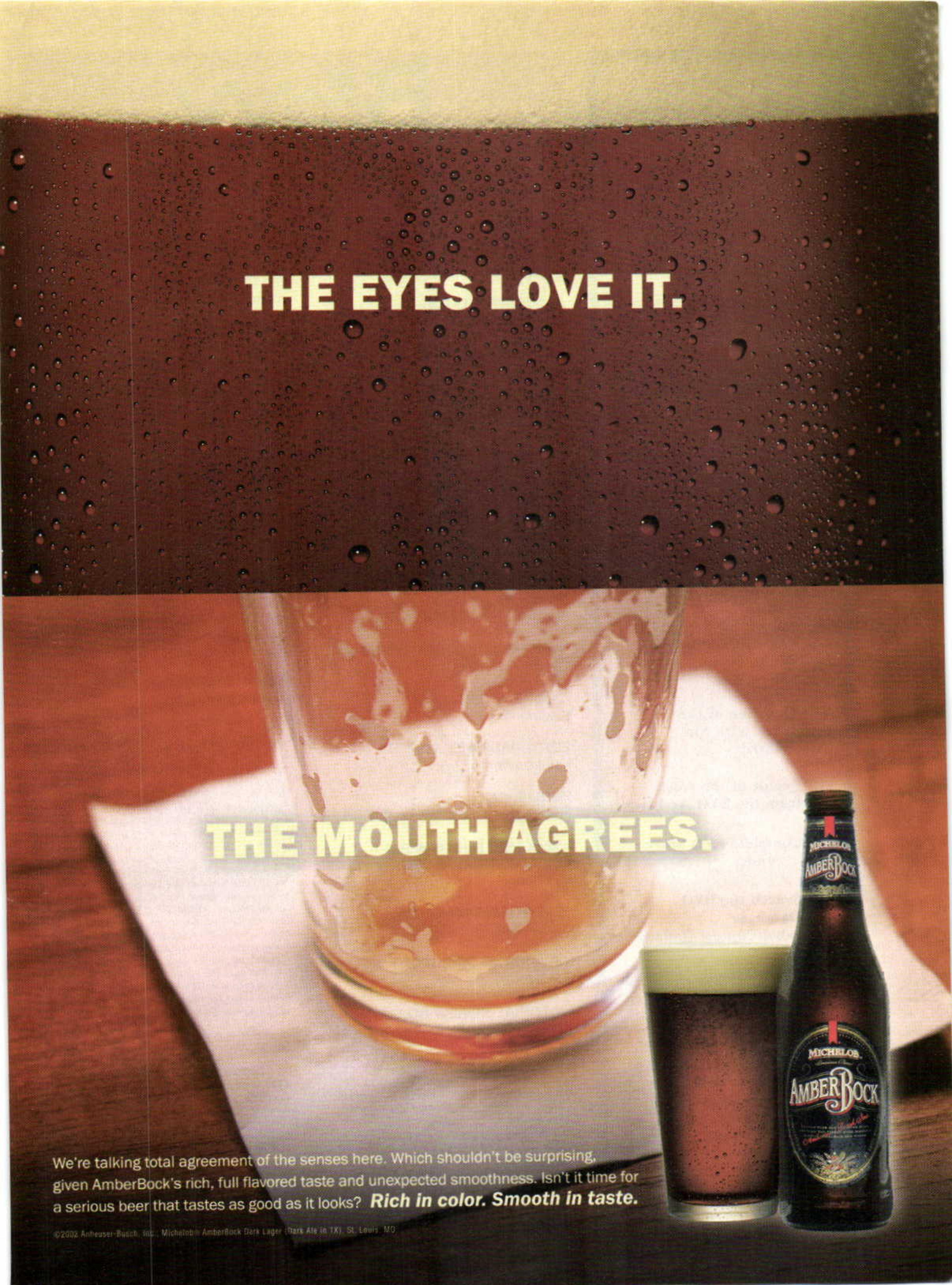
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THE HOW-TO HOMEBREW BEER MAGAZINE

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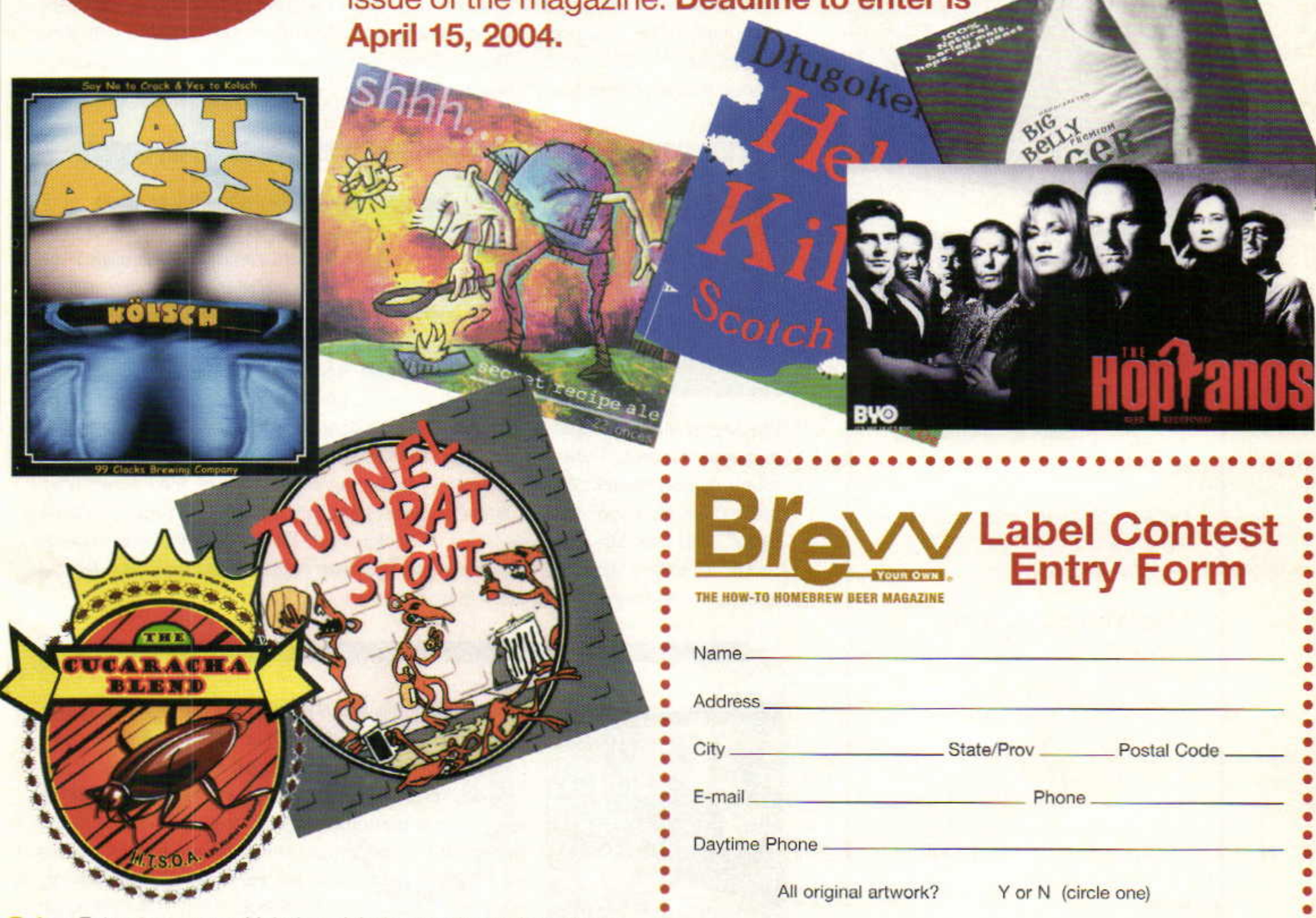
Volume 10, Number 1: January-February 2004

Brew Your Own's 9th Annual Homebrew LABEL Contest

WIN GREAT HOMEBREW PRIZES!

Send us your best homebrew labels and you could win some great brewing prizes from **BYO** advertisers! Enter as often as you like, but you can only win one prize. Winners will see their artwork featured in the July-August issue of the magazine. **Deadline to enter is April 15, 2004.**



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

Brew Your Own — Label Contest Entry Form

THE HOW-TO HOMEBREW BEER MAGAZINE

Name ____________________

Address ____________________

City ____________ State/Prov ________ Postal Code ________

E-mail ____________ Phone ____________

Daytime Phone ____________________

All original artwork? Y or N (circle one)

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

DEADLINE: April 15, 2004

RECIPE INDEX

BYO RECIPE STANDARDIZATION

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

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

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

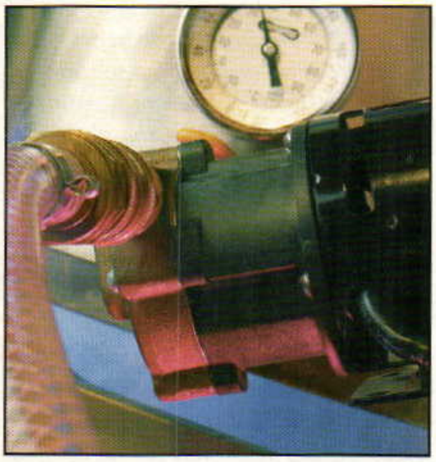
Hops:
We calculate IBU's based on 25% hop utilization for a one hour boil at specific gravities less than 1.050.

Contributors

Ashton Lewis is the technical editor of ***Brew Your Own*** magazine. Ashton began homebrewing in high school and is now the Master Brewer of Springfield Brewing Company. He studied Food Science at Virginia Polytechnic Institute, home of the famous Virginia Tech Hokies, 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). Ashton also wrote the chapter "Brewing Stouts at Home" in Michael Lewis' book, "Stout" (1995, Brewers Publications). 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, London in 1992. Also, like many other students at UC Davis, he worked part-time at the local brewery, Sudwerk Privatbrauerei Hübsch. Ashton has won numerous brewing awards, including a gold medal at the 2003 Great American Beer Festival (GABF) for Springfield Brewing's Mueller Unfiltered Wheat. Ashton has also won awards for beer writing. His 2001 article "Homebrew U" (cowritten with Chris Colby) won second place in the (now defunct) Quill and Tankard Awards in their brewing category. In addition, his 2001 article "Beano Brew" produced an explosion of discussion among homebrewers when it was first floated.

Tess and Mark Szamatulski are both contributing writers and members of ***BYO's*** review board. The Szamatulski's are also the authors of two popular homebrew recipe books, "Clonebrews" (1998, Storey Books) and "Beer Captured" (2001, Maltose Press). In this issue, beginning on page 28, they contribute recipes for Abita Amber and Dixie Blackened Voodoo Lager to our "Mardi Gras Clones" story. Previously, the couple authored the story "Beer and Cheese" in the May-June 2003 issue of ***BYO***. If this stout-themed issue of ***BYO*** inspires you to run out and brew one, their books have many great stout clones, including Guinness, Murphy's and Dragon Stout in "Clone Brews" and Beamish, Brooklyn Black Chocolate and Old Rasputin Russian Imperial Stout in "Beer Captured." The Szamatulskis own Maltose Express, the largest homebrew and winemaking store in Connecticut.

Charlie Parker's first ***BYO*** assignment required him to photograph a sheep — a big and rowdy sheep — as it peered over bottles perched on a stone ledge. From that day forward, Parker has been the man behind the lens. Charlie graduated in 1983 from the Rhode Island School of Photography and moved to Vermont to help his parents run their new inn. He never left. He and wife Meg are now settled in Quechee, close to the Killington ski slopes, with their son, Adam. Charlie established his freelance photography business, Images Plus, in 1985. His clients now range from Fortune 500 firms to mom-and-pop shops. And, of course, he shoots the cover for almost every issue of ***BYO***.



Pump Uses

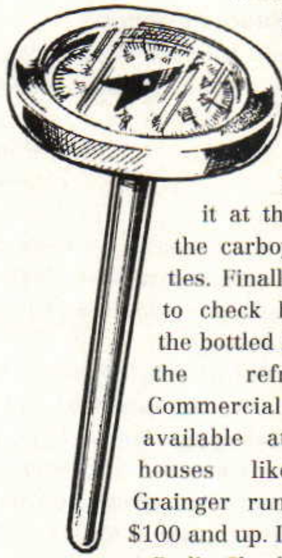
Thank you for your informative article on pumps in the November issue ("Move It!" by Thom Cannell). I have been using a magnetic drive polysulfone impeller pump for many of the all-grain brewing uses you mentioned in the article. Can I use this same pump for non-brewing day applications, e.g., racking finished beer to kegs? What factors might one consider in buying and using a pump for cellar work in the homebrew-house?

Chris Stokes
Layton, Utah

If your pump is suitable for brewing day applications, it should be suitable for cellar work. There's no reason to get a second pump for transferring beer to kegs.

Temperature Tool

I would like to add to the article "A Matter of Degrees," by Steve Parkes (November 2003). I have found my infrared thermometer to be indispensable when brewing. These thermometers are great because the wort is never touched. Just point, press the button and get the temperature instantly. There are limitations. An infrared thermometer only measures the heat radiating from the surface and can't be used to measure the middle of things like the mash or hot liquor. Also, it can't measure things that reflect like a shiny stainless pot. During a brewing session I first point my infrared thermometer at the wort to know if it's cool enough to pitch the yeast. Then I use it to monitor the fermentation temperature by pointing it at the side of the carboy or bottles. Finally I use it to check how cold the bottled beer is in the refrigerator. Commercial types available at supply houses like W.W. Grainger run around $100 and up. I got mine at Radio Shack on sale for about $20; they are normally $50.



Joe Miller
Raleigh, North Carolina

There are potentially a lot of applications for infrared thermometers in homebreweries. As you mention, being able to measure the surface temperature of wort or beer without physically touching it eliminates the need for sanitizing a thermometer.

Coefficient Correction

As a long-time subscriber, I was very pleased to note that you had chosen to feature some good "techie" articles in the November issue. I am referring to the articles on PID controllers, pumped systems, refractometers and step mashing. But it was with great regret that I also noted an error in the second equation on page 47 in the refractometer article. The equation must be missing some exponents. Having three different constants multiply the same Brix reading with the results added is just too silly to be correct. If that were the case, the three constants would have been combined into one.

Dave Towson
Bel Air, Maryland

You're right. The exponents are missing from the equation. The equation should read:

$$SG = 1.000019 + [0.003865613(Brix) + 0.00001296425(Brix^2) + 0.00000005701128 (Brix^3)]$$

Priming Primer

I've been brewing for about 14 years now and all of a sudden the other day something struck me that I've been taking for granted for all these years. I still bottle and normally use ¾ of a cup of corn sugar to prime. I just pour the corn sugar into a measured cup container until I hit the ¾ cup mark and then boil it with water. The question is: should I be packing the corn sugar down, which of course means more sugar? What is the weight (oz/grams) of ¾ of a cup of corn sugar? It's a pretty simple thing but can make a big difference. I've never seen or read anything about this and it just always says "use ¾ cup corn sugar to prime."

Dave H. Hrdlicka
Christiansburg, Virginia

Just measure out the corn sugar without packing it down. Although measuring solids by volume allows room for some variation due to differential packing, the differences in carbonation due to measuring error will *be minor. If you are really interested in priming with precisely the same amount of corn sugar each time, you can always weigh it out. Three-quarters of a cup of corn sugar should weigh about 5.0 ounces (140 mg).*

PVC Plastics

I'm interested in getting into homebrew, but I'm worried about chlorine and leeching from PVC and other plastics that most every homebrew kit seems to rely on. This stuff is not good for you. I've seen people build homebrew concoctions with what looks like automotive hosing. Makes me want to puke to think about how this affects taste, let alone how it might introduce trace toxins into things.

Are you aware of any kit suppliers that specialize in glass or stainless steel only components, or do most homebrewers just piece together their own stuff?

Paul Bramscher
via email

Automotive hosing? Who have you been hanging out with? Most homebrewers ferment in food-grade plastic buckets, glass carboys or stainless steel fermenters. Any equipment bought through a homebrew shop should be safe for use in brewing.

Recipe Reconstruction

If I find a beer at a local brewpub I enjoy, how would I go about cloning this beer?

Bill Messer
via email

Well, one option is to write our Replicator with your request. However, it looks as if you are looking for a way to do this yourself.

If you're trying to develop a clone recipe on your own, the best way to start is by asking the brewer. If you tell the brewer you're a homebrewer and you think his beer is great, he'll likely be more than happy to talk to you. If you're lucky, he might hand over the recipe for his beer. At a minimum, he might tell you what the ingredients are and give you some idea of how much to use. Some brewers — especially those who work for chains — may be bound by confidentiality agreements, but most brewers are happy to talk to homebrewers. If you do talk with the brewer, remember that the recipe is only half of the story. Find out as much about how the beer is made — fermentation temperatures, conditioning times and etc. — as possible.

If the brewer won't talk or isn't available, take a look around the brewery and see what you can see. Many brewpubs give a brewery tour, have a website or print info about their beers on their placemats. You can glean a lot of info that way.

Finally, and most obviously, let your taste buds guide you when formulating your recipes and procedures. Taste your beer and your target beer side by side. Then take notes on your tasting and brew the beer again. ■

brewer PROFILE

Ernest Wakukawa • Honolulu, Hawaii

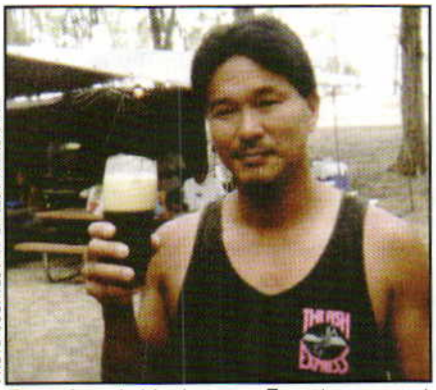


PHOTO COURTESY OF ERNEST WAKUKAWA

Even though it's January, Ernest can sport tank tops like this while brewing in Hawaii.

It was the year 2000 when my good neighbor-buddy Dr. Randy Larsen got an itch to brew beer. Back then, we'd pal around the neighborhood drinking mostly light beers and occasional selections of Samuel Adams, Gordon Biersch, and Sierra Nevada. We'd toss around the idea of homebrewing every so often, but never really got started until that one day in 2000.

That summer, the local drug store had begun bringing in "Vanilla Porter" by Stoney Creek Brewery. The Vanilla Porter was so awesome, but once the supply ran out, it was never restocked. That was what really made us serious about homebrewing.

We took our first step that summer by ordering a kit and two simple extract recipes online. It still took us two months after getting our kit to start brewing. We're always pretty busy surfing and fishing.

Finally, in October we made our first batch. We experienced all the nuisances of the novice. This included the frustrating discovery that the 10 quart (9.5 L) soup pot was not big enough to handle hop boil over. Another fun episode was when we sanitized the empty bottles with iodine then rinsed them out with high pressure garden hoses and primed each bottle with dextrose before realizing the instructions called for priming in the bottling bucket. Ferment blowouts didn't happen until later, when we got into glass carboys. Those are good days to drink to (and forget).

Since our initial October Y2K batch, we've been brewing at least a batch a month and I'm proud to say that we've never had to toss out a single batch of homebrew. We've since gotten to naming our carport brewery the *Ipu Kula* Brewery. *Ipu* is part of the name of the cul-de-sac we live in, which in Hawaiian means bottle gourd or container. *Kula* means golden. A rough translation: The Golden Beer Mug Brewery.

My buddy Randy has since moved to Florida to teach chemistry at the University of Southern Florida and has a bunch of his undergrads brewing hard ciders, meads and beer. Since I'm left brewing by myself, I've scaled down to three-gallon (11.4-L) batches, which are much easier to carry and require fewer bottles to sanitize and cap. I don't really clone too many beers anymore. Since last fall, I've started making lots of nicely hopped, high-alcohol brews.

I am not your traditional, follow-the-recipe type of brewer. I'm always interested in finding some way of spiking my brew styles. I have found that adding a small (1.5 oz) box of raisins to the initial ferment gives the brewed batch a rather interesting kind of wine-like "high-note" to the mouth feel. The idea came from a *BYO* "Choctaw" recipe (Pot Shots, May 2001). I have also successfully used Ovaltine in place of dry malt extract. I have found that Ovaltine works well with stout styles.

Looking back, these are the things that have really helped me in my brewing: knowing an experienced beer maker (for me, this was my beer guru, Wesley Wilson), a friendly and well-stocked brew shop (like Hawaiian Style Homebrew) and *BYO* articles to spark my interest in making more beer.

To all who have helped me to brew better beer, a big *mahulo nui loa* (thank you very much)!

reader RECIPE

Ernest's Red Ginger Ale
5 Gallons (19 L)

7 lbs.(3.2 kg) liquid pale malt extract
8 oz. (224 grams) 60 °L grains
2 oz. (56 grams) roasted barley grains
2 oz. (56 grams) honey
2 oz. (56 grams) Northern Brewer (60 minutes)
1 oz. (28 grams)Willamette (5 minutes)
1 oz. (28 grams) Willamette (0 minutes)
White Lab's California Ale Yeast (WL 001)
32 oz. (960 mL) bottle of Santa Cruz Organic Ginger juice (from Santa Cruz Natural Inc.)
¾ cup priming sugar

Step by step:

Start yeast about four days prior to brewing; dissolve ½ cup light dry malt extract in 24 oz. (720 mL) preboiled H_2O. I use a 26 oz. (780 mL) apple cider bottle with a breathable silicone airlock. Cool to below 80 °F (27 °C) and pitch. Let sit at room temperature.

Steep all grains for 30 minutes at 150 °F (66 °C). Strain out grains, add extract and bring to boil for 60 minutes with Northern Brewer hops. Add Willamette during the last five minutes and at end of boil. Cool down, pitch yeast starter and aerate. A "blow off" air lock is recommended rather than the conventional ones because the yeast starter takes off powerfully. Ferment 10–14 days, rack to secondary fermenter and add Santa Cruz Organic Ginger juice for another 7–10 days. Bottle with priming sugar. Initial coloring appears like a nut brown, but after bottle conditioned for about five weeks, it will turn a beautiful deep red. *Okole-maluna* (bottoms up)!

BREWER'S DICTIONARY

G is for . . .

gelatin: a colorless and tasteless protein used as a fining agent.

gelatinization: the transformation of starch from a solid, crystalline form to a liquid, soluble form. It occurs when starch is heated in water. Gelatinized starch can be attacked by mashing enzymes whereas ungelatinized starch cannot.

grist: crushed malt and adjuncts mixed with hot water for mashing

growler: a container like a jug used to carry draft beer purchased at local brewpubs

gypsum: hydrated calcium sulfate used to treat soft or neutral water making it hard

H is for . . .

head: the foam at the top of a poured beer

heat exchanger: equipment used to heat or cool the wort rapidly

high gravity: an original wort gravity of 1.060 or greater

hops: the flowers or cones of the female hop plant used in brewing to impart flavor and bitterness. These can be used whole, or in form of pellets or plugs.

hop bitterness unit (HBU): This is a value assigned to a hop for the purpose of identifying bitterness. The formula, devised by Fred Eckhardt, gives the brewer the ability to calculate the amount of hops to use in order to achieve the desired bitterness.

hot break: the precipitation of protein and tannic matter when hops are added to boiling wort

hop extract: resins and oils extracted from hops by using organic solvents or liquid carbon dioxide

hydrometer: a glass instrument used to measure the specific gravity of beer by comparing it to that of water

homebrew CLUB

WHALES

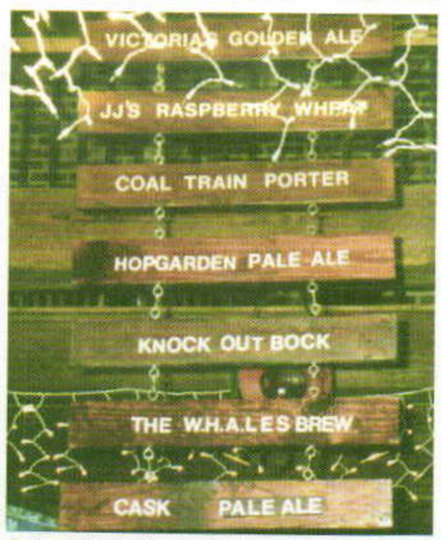
Edison, New Jersey

The Woodbridge Homebrewers Ale and Lager Enthusiasts Society (WHALES) was created in 1996. WHALES has developed a strong core membership over the past seven years. The club strives to educate members on all aspects of beer and brewing. Recent meetings have featured sessions on pairing food with beer, the history of Imperial Stout, recipe formulation, hop utilization, Belgian beers, lagering techniques and "beer mixology" (i.e. drink concoctions). We also have a tasting session at each meeting. Homebrews are sampled and judged for accuracy of style. Positive criticism is emphasized and brewing problems are discussed. The end result may be the best beers on the planet! Every brewer in the club has made an exceptional beer at least once, but the norm for these WHALES is to make exceptional beers each and every time!

Beer may be the beverage of choice for many WHALES members, but anything fermentable is fair game. The club has several excellent wine makers; others make their own mead by fermenting honey. Some ferment apples into hard cider. One brewer even made batches of Kumiss by fermenting milk. Members have experimented with unique ingredients in brewing including cashew nuts, coffee, chocolate, spices, herbs and various fruits.

Some award-winning WHALES homebrews are Pilsners, Belgian Wits, and Weizenbocks. Club president Keith Seguine took best of show at the 2003 War of Worts for his velvety smooth southern brown ale. Aside from the monthly meetings, WHALES enjoys many other extracurricular activities and all things beer related. They have an annual BBQ picnic each summer, members "Pub Crawl" several times a year and sample commercial brews. "Brew Bashes" occur when the entire group brews together at one location to share techniques. Members also gather at various parties throughout the year including a summer chili cookoff, Octoberfest and a Christmas party. Feel free to visit us online at www.whalesclub.org.

-Kenny Schrader



Edison, New Jersey is home to many great things — Number six on the list appears to be the WHALES brew.

replicator

by **Steve Bader**

Dear Replicator,

I recently went to a gathering where there was a Party Pig of Rockyard's Double Eagle Ale (Castle Rock, Colorado). This was a great, easy drinking beer that I thoroughly enjoyed. I was actually surprised to discover it was a wheat-based beer. The following week this beer won a gold medal at the 2003 Great American Beer Festival! It may be tough to get a clone for, but I would appreciate your effort!

Gregg Schuster
Arvada, Colorado

I spoke to Jim Stinson, brewmaster at Rockyard Brewing about this excellent beer. Jim is a graduate of the Siebel short course on brewing, and has been brewing professionally for over seven years. Prior to that, he was a homebrewer for two years and said *BYO* was part of his early brewing educational materials.

Jim described Double Eagle Ale as an American Style Wheat beer (which means it has at least 20% wheat in the grain bill). Double Eagle is a balanced beer with light to medium body, grainy sweetness from the Munich and wheat malts and a floral aroma with a bit of a crisp citrus finish.

For more information visit the RockYard Brewing Company Website at www.rockyard.com or call 303-814-9273.

Rockyard Brewing Company — Double Eagle Ale

(5 gallons/19 L, extract with grains)

OG = 1.052 FG = 1.014
IBU = 27 SRM = 6 ABV = 4.8%

Ingredients

- 3.3 lbs. (1.5 kg) Briess wheat Unhopped malt extract syrup
- 2.25 lbs. (1.0 kg) Briess wheat dry malt extract
- 0.5 lbs. (0.22 kg) 2-row pale malt
- 0.5 lbs. (0.22 kg) Munich malt (10 °L)
- 0.5 lbs. (0.22 kg) wheat Malt
- 1 tsp. Irish moss (boil 60 minutes for clarity)
- 6.5 AAU Perle hops (60 mins) (bittering hop) (1.0 oz. of 6.5% alpha acids)
- 4.0 AAU Hallertauer hops (aroma hop) (1.0 oz. of 4.0% alpha acid)
- White Labs WLP051 (California Ale V) yeast or Wyeast 1056 (American Ale) yeast
- 0.75 cup of corn sugar (for priming)

Step by step

Steep the three crushed grains in 2 gallons of water (7.6 L) at 150 °F (66 °C) for 30 minutes. Remove grains from wort, add malt extracts and 1 gallon (3.7 L) of water and bring to a boil. Add Perle (bittering) hops, Irish moss and boil for 60 minutes. Add the Hallertauer aroma hops for the last 10 minutes of the boil.

When done boiling, add wort to 2 gallons (7.6 L) cool water in a sanitary fermenter and top off with cool water to 5.5 gallons (20.9 L). Cool the wort to 80 °F (27 °C), aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68–70 °F (20–21 °C) and hold at these cooler temperatures until the yeast has fermented completely. Bottle your beer, age for two to three weeks and enjoy!

All-grain option:

This is a two-step mash. Your grain bill will be 7 lbs. (3.2 kg) of pale 2-row malt, 3 lbs. (1.4 kg) of wheat malt, and 0.5 lbs. (0.2 kg) of Munich malt. Mash in your grains at 122 °F (50 °C) for 30 minutes, then raise the temperature to 149 °F (65 °C) for 60 minutes. Collect enough wort to boil for 90 minutes and have a 5.5-gallon (20.9-L) yield. Lower the amount of Perle boiling hops to 0.75 oz. (21 grams) to account for higher extraction ratio of a full boil. The remainder of the recipe is the same as the extract.

homebrew calendar

January 17
Extreme Beer Fest

BeerAdvocate.com's Extreme Beer Fest will feature beers that push the boundaries of brewing and the palates of beer lovers. Exotic ingredient brews, hop-monsters, high alcohol beers and rare beer styles will be judged. The fest will be held at The Cyclorama at The Boston Center for the Arts on Saturday, January 17 with two sessions, plus a special connoisseur session. The sessions are $25 in advance or $30 at the door, and the connoisseur session is $35.

January 24
The Big Bend Brew Off

The annual Big Bend Brew Off will be held this year at the Homebrew Den, 1350 East Tennessee Street in Tallahassee, Florida. All beer categories will be accepted between January 5 and January 16 at the Homebrew Den. Judging begins at 9:30 a.m. For more information visit www.nfbl.org or contact Sarah Bridegroom via email at sarahbridegroom@netscape.net or telephone at (850)422-3625.

February 21
War of the Worts IX

War of the Worts IX is an American Homebrewer's Association sanctioned competition and provides you an opportunity to have your homemade beer and mead evaluated by BJCP registered judges. Prizes and awards will be given for beers placing first, second, and third in each category and for Best of Show. The competition will be held on Saturday, February 21st at the The Drafting Room, in Springhouse Pennsylvania. Judges should be there at 9:00 a.m., and winners will be announced at 4:30 p.m. This event is sponsored by Keystone Hops. Entries will be accepted between January 26th and February 24th. Entries are $6 for the first entry, $5 for each additional entry. For more information contact Vince Galet via email at vince_galet@merck.com or by telephone at (215) 328-2584.

homebrew SYSTEMS that make you DROOL

The Jet Engine Beer Cooler

Simon Jansen • Avondale, New Zealand

This Guinness Draught can is inscribed "serve extra cold." Upon further inspection, Simon found that 14 °C did not suffice . . . so he build himself a jet engine.

Keeping beer cold while you're out in the shed has always been a challenge. Finding the ultimate solution was a trial and error process. My first solution was to surround my beers with ice. Unfortunately that small quantity of ice would not keep multiple beers cold all day — and no, you cannot, under any circumstances, put ice into the beer.

Obviously, I had to come up with a better solution to the problem. I remembered from some old physics lecture that when a liquid expands into a gas it draws heat from its surroundings. I happened to have a source of suitable liquid in the form of liquid petroleum gas. Naturally, I could not evaporate vast quantities of flammable gas into the closed confines of my garage. That would probably be dangerous. What I needed was a way to remove the dangerous gas. The solution was obvious. The gas is flammable, so why not burn it? Burning the gas with a normal burner would not use up the gas fast enough to give me any serious cooling, so I needed a way to use a lot of fuel very, very quickly. I needed a jet engine!

Jet engines use a lot of fuel. A small one running in my shed would use enough fuel to sufficiently cool my beer. I went to work. After much investigating, designing, building and dodgy welding, I built my engine.

You can see the cooling effect on the gas tank by the layer of ice that forms. All that was left was to place the tank in a container of water, add the cans of beer and fire this baby up!

And now the results: The experiment was a complete success. The engine itself will run up to 100,000 rpm with exhaust temperatures around 932 °F (500 °C) and noise levels in excess of 125 decibels.

The beer is successfully chilled to a nice 36 °F (2 °C). It's a good thing, because a cold beer is just what you need when you're standing in a shed with a jet engine running. Check out more background on my jet engine cooler online at www.asciimation.co.nz/beer.

A jet engine in its simplest form consists of a combuster, a turbine and a compressor. One day it dawned on Simon that this combo could also equal a beer cooler.

we want you

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

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Roasted Barley

Get the low down on this dark grain

by Thomas J. Miller

From red ale to porter, stouts to your favorite holiday brew, roasted barley is a dark specialty grain with zip and pizzazz. Use it for color, added sweetness and fermentable sugar, or simply for matters of taste. It's no magic bullet, but this venerable grain is a serious weapon to add to your homebrew arsenal.

Brewer: Rich Norgrove, Jr. is the head brewer at Bear Republic Brewing Company in Healdsburg, California.

There are a lot of similarities between black malt and roasted barley (enough to cause confusion among certain brewers). Basically, black malt is going to come across as burnt and acrid with a dry character. It is more of an additive, for color and flavor, but it does not lend sugars to impact the specific gravity of the beer.

Roasted barley has many of the same characteristics of black malt, though it is far more complex. It actually has some starch that can be converted during the mash, thus impacting the specific gravity. Roasted barley will also lend to the sweetness of a beer.

At Bear Republic, we produce beers that emphasize what I'm describing here. We make two porters: One uses roasted barley in the mash and is sweet, the other uses black malt and is very dry. We also have a Russian imperial stout that actually uses both roasted barley and black malt. This beer starts sweet — a product of the roasted barley — and finishes dry, thanks to the black malt.

The neat thing about roasted barley is that there are plenty to choose from: 6-row, 2-row, English and American. Some of what you use might depend on what your homebrew supplier offers, but if you have a chance to shop around and experiment with different types, you might be surprised at the differences.

Typically, if 2–3% of your grist is roasted barley, you should get a very distinctive flavor. Aside from our porter and imperial stout, we have used roasted barley in our brown ale with a great deal of success.

Brewer: Peter Licht has been the masterbrewer at Coast Range since its inception in 1994. Prior to that, he completed the U.C. Davis Masterbrewers program, passing the IOB Associate Members examination in June 1994.

Most brewers have some familiarity with roasted barley. It is one of the very darkest grains used and is characterized by an intense, roasty aroma. I find it to be reminiscent of French roast coffee beans. In fact, roasted barley and French roast coffee are actually produced in a similar manner. The unmalted barley grains are churned in a roasting drum and heated nearly to the point of combustion.

Roasted barley is available in a range of colors from 350–550 Lovibond. As you might expect, the intensity and character of the grain varies with the color. The darkest of the roasted barleys — in the 550 °L range — are the classic grain for the dark character of stouts, especially Irish dry stouts.

If you want to produce a black, almost opaque beer, the minimum amount of dark roasted barley that you want to use is 7% of the grist. You can increase this up to 15% and will find that as you do so, the roastiness of the beer will also increase. Using more than 10% will give more of a smoky, burnt profile. This is a characteristic that is more common in American microbrewed stouts rather than Irish dry stouts.

Roasted barley has an acidifying effect on the mash. Because of this, brewers tend to treat the mash with calcium carbonate to keep the pH in the proper range. The proper mash pH is about 5.2–5.5 for almost all beers. Stouts, due to the dark grains, will tend to be on the lower end.

It is no mystery why cities with naturally carbonate water (such as Dublin, London and Munich) are known for dark beers — the water keeps the pH in balance despite the acidifying qualities of the darker grains, resulting in outstanding brews.

Roasted barley can also be well employed by extract brewers. All they have to do is steep the grains in the kettle. If I were making an extract brew that would benefit from a fresh roasted barley character, I would steep the whole grains in the kettle prior to to the boil for 5–15 minutes in a sack, or nylon stocking. I would recommend keeping the water between 160 and 175 °F (71–79 °C).

LONGWOOD BREWPUB

THE SPIRIT OF THE ISLAND

Brewer: Harley Smith is the head brewer at Longwood Brewpub in Nanaimo, British Columbia.

There are three basic types of roasted grains: chocolate malt, black patent malt and roasted barley. Roasted barley is unlike the other two grains because it is made from unmalted barley.

Raw barley goes directly into the roaster and is heated to temperatures as high as 446 °F (230 °C). The length of roasting time determines the darkness of the grain. This can vary from 250–600 °L. It is during this roasting process that all the unique flavor profiles of roasted barley are produced. The most predominant characteristic is nutty and coffee-like.

Of the three dark malts, roasted barley produces the lightest colored head. This is one of the characteristics that makes roasted barley an excellent choice for brewing dry Irish stouts.

In dry stout, the focus of flavor is roasted barley. It is rumored, for example, that the Guinness (James Gate) brewery uses a combination of pale ale malt, flaked barley (30%) and roasted barley (10%) to achieve its legendary flavor. Simplicity is bliss!

A more balanced, dark malt attack should be used when making porter. Mix black patent and chocolate with your roasted barley. If the recipe calls for 9% dark malts, 3% chocolate, 3% black patent and 3% roasted barley will give you a good starting point for flavor comparison.

Another unique characteristic of roasted barley is the deep red mahogany color that it imparts in beer. For this reason, it is excellent when combined, in small quantities, with medium Lovibond caramel malt to produce red ales.

The rule of thumb for using any dark malt is "a little dab will do ya." For nut brown ales, this means 2–4% of the total grist. For stouts and porters, use no more than 10%. If you overdue it, a sharp acrid and acidic flavor, not to mention a tar-like quality, will definitely challenge the consumer. It will also make balancing the hops difficult.

If you are not into all grain brewing, any specialty malt can be used in a steeping bag. Steep the grain at a ratio of 1 lb. (0.45 kg) to 1.5 quarts (1.4 L) of water at 150–160 °F (66–71 °C) for 20 minutes. This may not seem like a lot of water, but diluting the grain too much can leach tannins and acids into the water. Wringing out the bag will also have the same leaching affect. ■

A Champagne Kick

"Help Me, Mr. Wizard"

Polymer piping, timing your O_2, conicals and more

It's so dry I could cry

I have attempted to make an imperial IPA and added Champagne yeast after primary fermentation to give it some extra kick. The extra kick that I got was more like a kick in the head. The brew is now in the secondary and I can already tell that it is far too dry for my liking. How can I give some malty sweetness back to my brew without starting all over? Is it possible to make a late addition of extract and pray, or will this cause pressure problems when it is transferred to bottles?

Phil Williams
Lock Haven, Pennsylvania

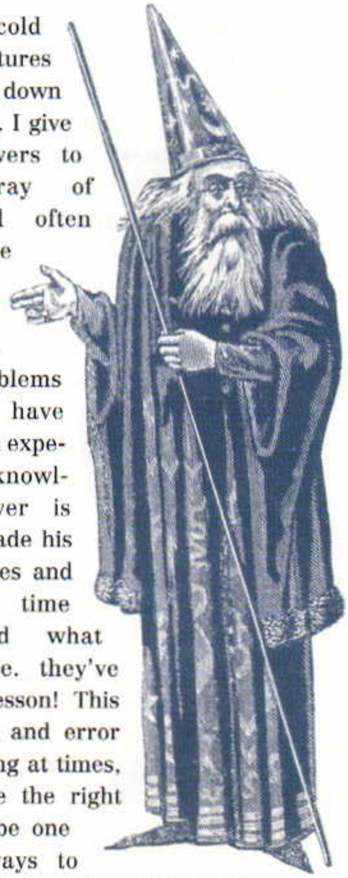
Your problem in a nut shell is yeast selection. Champagne yeast is one of those yeast strains that tends to be highly attenuative and creates a very dry finished product. I am not a huge fan of extremely strong beers and typically brew with an original gravity of 18 °Plato (1.072) or lower. I have never had fermentation problems with these beers using my brewery's standard ale and lager strains. In fact, we brewed a barleywine last year with an original gravity of 25 °Plato (1.100) and it fermented to completion with our standard ales yeast without problem.

My point is that I really have never understood why Champagne yeast seems so popular for strong beers. Most brewing strains can ferment strong worts as long as the yeast is healthy and you pitch enough, the importance of which really cannot be stressed enough! Some of the whacked out, super-strong beers being brewed cannot rely on this advice because they are simply too strong for conventional methods. Brewers must do things such as change their yeast strains and slowly feed their fermentations to successfully make their odd tipples. Imperial IPA's, however, do not fall into this category of beers and the Champagne yeast is not a requirement.

So you have this really dry, fairly bitter beer and wish it had more balance to it. There are several things you can consider here and they involve adding something "sweet" to add back what the Champagne yeast took out. One method I like is adding a different beer and doing a little blending. Blending is a really great tool used by winemakers, distillers and a few brewers to take two or more products whose sum is greater than the individual pieces. When most brewers talk about blending the thought of mixing several batches of the same beer to improve consistency comes to mind. That's not the kind of blending you need. With this beer you could blend in some sweet stout to create a weird beer that may not have an identifiable style, but may have a satisfying flavor — maybe you could call the concoction Imperial Brown Ale and invent a new style. You could add extract to the beer for sweetness, but you probably would be jumping from the pan into the fire. You might end up wanting to get rid of the worty flavor in your new creation.

Of course both of these methods have one problem — Champagne yeast. If your beer still contains viable Champagne yeast cells, which it probably does and will continue to for quite some time, the added beer or wort will be dried out like your original beer. Depending on the population of viable Champagne yeast this can happen relatively quickly or take a very long time.

This is somewhat of a double-edged sword. If you are able to correct the dryness issue and drink the beer before the Champagne yeast dries it out again, you'll be in good shape. However, if you bottle your new creation and let it sit around too long, you will begin to see over-carbonated bottles of beer and quite possibility explosions. Kegging your beer and keeping it very cold is a possible alternative to bottling and eliminates the explosion issue. The cold storage tempertures will also slow down the yeast action. I give a lot of answers to a wide array of questions and often discover that the questions I am best equipped to answer relate to problems that I myself have encountered. An experienced and knowledgeable brewer is one who has made his share of mistakes and taken the time to understand what occurred — i.e. they've learned their lesson! This process of trial and error can be frustrating at times, but if you have the right attitude it can be one of the best ways to really hone your brewing skills. If I were in your brewery boots I would try to salvage this beer just to gain the experience. If you're lucky, you'll end up with a tastier and more gratifying batch of beer!



What to know about CPVC

I am looking to expand my homebrewery and was wondering if there are any issues with using CPVC pipes instead of copper to move my wort around. Minus the top service temperature of 200 °F (93 °C), are there any other issues that I should be aware of with using CPVC?

Chad Ostram
Genesee Depot, Wisconsin

The most important thing to consider when evaluating materials of construction is product compatibility. CPVC or chlorinated polyvinyl chloride is a heat resistant type of PVC and is rated for continual exposure to water at 190 °F (88 °C). The main use for CPVC is hot water lines in new homes. The advantages of this type of piping are that it is easy to cut and "weld" together with liquid PVC bonding agents; it stands up to high temperatures; CPVC is a food-grade polymer; and it stands up to a wide range of brewery cleaning solutions including strong bases like caustic and acids like phosphoric acid.

I prefer rigid piping or tubing, such as copper or stainless steel, for permanently installed wort lines because these lines just feel tougher. With this personal opinion aside, I can't think of any red flag issues concerning CPVC in the homebrewery other than the obvious — you don't want to use this plastic with boiling wort as it's not rated for temperatures that high. Another thing to be mindful of is keeping this material away from the flame under your wort kettle or hot water tank.

Punctual aeration

I read that the best time to introduce oxygen into wort is on the second day of fermentation. Is this a fact, or is aeration better immediately after cooling the wort, just before pitching?

Sergio Petriw
Bariloche, Argentina

Wort aeration timing is one topic that is widely agreed upon by commercial brewers and is a widely repeated rhetoric. When I give tours of the small brewery where I work, I usually say something like ". . . and after the wort is cooled, it passes through the wort aerator. Wort aeration is the only time we intentionally add oxygen to the process."

The conventional view on wort aeration is, and has been for decades, that it should be performed immediately after wort cooling, prior to yeast pitching. The reason for this belief is very pragmatic. Oxygen is more soluble in cool wort than it is in hot wort, therefore we aerate after cooling (aerating hot wort also leads to wort darkening). Yeast require oxygen to synthesize cell membrane compounds, like sterols and unsaturated fatty acids, used as building blocks for new yeast cells. Because yeast growth occurs in the early stages of fermentation, it makes sense to have oxygen in the wort for the yeast.

Some brewing researchers have actually been investigating the effect of aerating yeast prior to pitching and not adding any air to the wort. The objective here is to get oxygen to the yeast where it is needed and expose the wort to as little oxygen as possible.

The general consensus on oxygen and air is that exposure later in the process is much more deleterious to the finished product. In a nut shell, my advice to you is to play it safe and aerate immediately after wort cooling. After this crucial brewing step, do everything possible to keep air out of the beer.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"Help Me, Mr. Wizard"

Quizzical on conicals

I've been kicking around the idea of purchasing a conical fermenter for some time now. I see that they come in two varieties — stainless steel (which cost upwards of $450.00) and plastic (which go for about $100.00). My questions are, what is the downside to fermenting in a plastic fermenter and does a conical fermenter really help create better beers?

Jason from Alaska
via email

I'll keep this answer short and to the point so as not to confuse the topic. Plastic fermenters work fine for fermentation, but really should be avoided for prolonged aging. A longer-term aging should occur in either stainless steel or glass containers.

With this being said, let me elaborate a little. This opinion stems from the fact that most plastics, including the types used to make most buckets and fermenters, have extremely poor gas barrier properties (i.e. permeability). This means that oxygen can cross from outside into the beer in a plastic fermenter. The same thing happens with carbonated beverages stored in plastic bottles. Sodas, for example, will lose carbonation over time when packaged in plastic bottles. The new plastic beer bottles are made from very special polymers that have better gas barrier properties. This is a recent development that has taken years of research and many trial versions to make commercial brewers feel comfortable using.

The advantage to stainless steel and glass vessels is that these materials allow no gas transfer. Also stainless steel and glass are more difficult to scratch if treated with a modicum of care. Plastic, on the other hand, is easier to scratch.

Scratches are the sort of crevices that bacteria love and make sanitizing that much more difficult. Even without scratching the plastic surface, it is often the case that heavy-wall plastics are rougher on a microscopic level than steel or glass. In practical terms, this means that yeast may not slide as freely from a plastic cone as a stainless steel cone.

I would not say that conical fermenters alone make better tasting beer, but I would agree that they are the ideal shape for a multi-purpose vessel. The real advantage of conicals is that yeast will settle in the cone and can be removed from the fermenter with minimal beer loss. Most commercial brewers will reuse some of the yeast harvested from the cone of a fermenter and will discard yeast that is either not suitable for reuse (the first and last layers off the cone, for example) or yeast that is in excess of what is needed. This use of the cone comes early in the process, typically within a few days of the fermentation's end.

Another use of the cone comes later in the process during aging. In order to use the cone during aging, you need to age the beer in the fermenter. If you buy into my gas barrier argument, this means you are aging in stainless steel. During aging, more yeast will continue to settle from the beer. Over time this yeast will begin to die and autolyze or decay.

Yeast autolysis is bad for two reasons. For starters, yeast autolysis imparts off-flavors to beer. The other thing that happens with autolysis is an increase in amino acid concentration in the area surrounding the dead yeast. Most beer spoilage bacteria do better in high amino acid environments and the bottom of a fermenter full of autolyzing yeast is a perfect environment for bacteria growth.

When beer is aged in a conical fermenter, this layer of dead and decaying yeast is very easily removed from the bottom. Also, the off-flavors associated with yeast autolysis and the potential for bacterial growth can be greatly reduced if not eliminated.

The last real advantage to fermenting and aging in one vessel is that the number of beer transfers is reduced to one. This means you have only one fermenter to clean per brew and the chance of contamination and air pick-up encountered during racking is reduced. All-in-all, the conical fermenting (and aging) vessel, often referred to as a "unitank," is really a great tool.

How light is light

I bought a 55-lb. bag of dry malt extract that was labeled "extra light." When I brewed a helles lager for my first batch from the DME, it was not straw colored, but more like an amber. I don't think I caramelized the malt when boiling the wort, I used 2.5 gallons of water for a three gallon batch. At my homebrew shop, I was told that different DME manufacturers have different colors for light DME and it would "settle" out to a nice golden color. It cleared but has not become a nice golden color. Can an extra light DME change color, or was it something that I did in brewing?

Jim Forbes
Delafield, Wisconsin

Malt syrups can indeed change color over time if they are stored at

high temperatures or simply at room temperature for too long. This problem in dried products is uncommon since water is needed for most of the chemical reactions involved in darkening. I think the problem you have experienced is simply old-fashioned poor communication. Your expectation of color is something you have in your mind and the ingredient sold to you failed to meet your expectation.

The clearest method of communicating color is through some sort of color scale. Although color scales, such as SRM, Lovibond and EBC have their weaknesses, they do allow brewers to have some reference of color. I have always thought it odd that almost all grains sold in homebrew stores indicate color, yet many malt extracts — both liquid and dried — use vague terms like "amber," "light" and "dark." These terms are useful in describing colors in very broad terms but cannot be used for the type of accuracy needed to select the right DME to produce a helles lager.

I agree with the answer given at your homebrew store about different suppliers using the same color descriptor for different DME colors. I am in the process of finding a replacement for a certain brand of 55 °L crystal malt and have been surprised by fairly radical flavor differences between crystal malts with approximately the same color rating. I like to taste and smell malt before using it because you can really glean a lot from evaluating your grains. While DME is easy to taste in the dry form, it is difficult to evaluate its color. You may want to consider making up small liquid samples to evaluate the color before purchasing enough for a full brew.

One thing to keep in mind when considering how a finished beer will appear is that wort becomes lighter after fermentation. Once fermentation is complete, the color remains constant although the beer appearance will radically change (depending on how much yeast and haze particles are in suspension). Some filtration methods, such as membrane filtration, can cause beer color to lighten after fermentation. I don't think you are asking too much for a golden colored beer made from DME; I do think it is asking too much to get what you want when vague terms like "extra pale" DME and "golden colored" beer are used to communicate topics as seemingly complex as color. I would evaluate ingredients more thoroughly in the future to get a better idea of what you are buying. Good luck! ■

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! Who is Mr. Wizard? Stay tuned!

Dry Stout

The Brew of the Irish

by Horst D. Dornbusch

It is sometimes difficult, in a blind taste test, to distinguish certain dry stouts from such brews as Scotch ales, Scottish ales or porters. In theory, of course, the distinctions are clear: A Scotch ale should be fairly dry, like a dry stout, but its roasted chocolate notes should be much more subdued. The leading mass-produced brands of Scotch ales and dry stouts, at least by my pallet, seem to converge on this point. A Scottish ale, on the other hand should be much more alcoholic than the average stout, although this is not always the case when you encounter modern mass-market Scottish ales. A dry porter should have just a little less body than a dry stout, but the difference is not always perceptible — depending on what brand, microbrew or homebrew you are comparing.

In practice, therefore, your palate may say porter when the label says stout, or it may say stout when the label says Scotch ale. In spite of these taste ambiguities, there are a few brew-technical characteristics without which a dry stout just wouldn't be a dry stout. These traits relate mostly to malt choices and mash temperatures.

Simple Sugars Make Dry Beers

The key to making a dry stout — or a dry beer in general, be it an ale or a lager — is the choice of malt you purchase and the temperature at which you mash it. The basic rule that applies is that a beer will ferment to a dry finish if the wort you produce (or purchase in a can) contains very few complex, unfermentable, residual sugars. Because ale yeasts can ferment only simple sugars — that is, single-molecule and two-molecule sugars — you must purchase grains that have not been malted to contain a great deal of unfermentable sugars (*Hint: avoid crystal malts*). Likewise, you must create an environment in the mash tun that favors the enzymatic conversion of grain starches into simple sugars only. This means that you must also avoid a mash environment that favors the production of complex sugars.

First, some quick and heavy-duty terminology: The single-molecule sugars, or monosaccharides, in wort are mostly fructose and glucose. (Fructose, however, is not found in significant levels in all-malt beers or beers using rice or corn). The two-molecule sugar, or disaccharide, in wort is mostly maltose. The three-molecule sugars, or trisaccharides, in wort are mostly maltotriose and raffinose. All sugars of four or more molecules are called oligosaccharides . . . and there are hundreds of them. Certain oligosaccharides, called polysaccharides, can be split enzymatically in the mash to yield fermentable monosaccharides. Any leftover unfermentable polysaccharide fractions are called dextrins.

Armed with this information, we know that we must compose our dry stout grain bill to obtain mostly mono and disaccharides. This means we should avoid all sweet caramel or crystal malts that are especially formulated by the maltster to create nutty-sweet richness and a full-bodied mouthfeel. For this reason, Munich or Vienna malts are out. Also forbidden are any brewer malts that are labeled Carapils or dextrin malt. All these otherwise wonderful specialty malts contain too many unfermentable sugars for our purposes. These often appear in the form of hardened glassy crystalline sugars that were formed during the malt's pre-cooking and steaming in the maltster's roasting drum.

The base malt for a dry stout, therefore, should be a top-quality pale malt. Most purists would argue that the

dry stout by the numbers

OG	1.038–1.042 (9.5–10.5 °P)
FG	1.008–1.010 (2–2.5°P)
SRM	approximately 40–80
IBU	30 ± 5
ABV	usually 4–4.5%

RECIPE

Dry Cork Stout
(5 gallons/19 L, all grain)
OG = 1.040 FG = 1.008
IBU = 30 SRM = 42 ABV = 4.1%

Ingredients

6.7 lbs. (3.0 kg) pale malt (2–4 °L, such as Briess pale ale or Weyermann Pils)
10 oz. (280 grams) roasted barley (275–325 °L, such as Briess)
3 oz. (84 grams) chocolate malt (325–375 °L, such as Briess)
3 oz. (84 grams) black patent or similar malt (such as Briess at 475–525 °L or Weyermann dehusked Carafa III at 490–560 °L)
1 lb. (0.45 kg) pregelatinized flaked barley (1.5 °L, such as Briess Brewers Flakes)
1 tsp. Irish moss
6.63 AAU Fuggles (bittering) (1.3 oz. of 5.1% alpha acids)
1 oz. (28 grams) East Kent Goldings (flavor hops)
1 package of Irish ale yeast such as Wyeast 1084 or White Labs WLP004
1 cup DME or corn sugar (for bottling)

Step by Step

Mix the unmilled pregelatinized barley flakes with the milled grains and mash for a single infusion mash at 148 °F (64 °C). Let rest for at least an hour. Start lautering while sparging with near-boiling water to raise the grain-bed temperature as quickly as possible to 172 °F (78 °C). Then reduce the sparge water temperature to hold this grain bed temperature through the entire sparge. Continue the sparge until the kettle gravity is about 1.036 (9 °P). Assuming a 10% evaporation loss during a 75-minute boil, the OG at the end of the boil should be at the target gravity. If not, extend the boil for a few minutes or liquor down the wort with cold water.

There are two hop additions, the first about 15 minutes into the boil, the second about 15 minutes before

continued on page 22

dry stout recipe continued

continued from page 21

shutdown. Add Irish moss 5 minutes before shutdown. Heat-exchange to 60 °F (16 °C), pitch the yeast and hold the brew at that temperature throughout the entire fermentation and conditioning period. Rack the brew once after about 10 days and a second time after another 20 days. Prime and package your brew and it should be ready after another week of conditioning.

Dry Cork Stout

(5 gallons/19 L, extract with grains)

OG = 1.040 FG = 1.008
IBU = 30 SRM = 42 ABV = 4.1%

Ingredients

- 4.1 lbs. (1.9 kg) pale ale or pils liquid malt extract (such as Alexander's, Briess, Coopers, Glen Brew, John Bull, Muntons or Weyermann)
- 10 oz. (280 grams) roasted barley 275–325 °L (such as Briess)
- 3 oz. (84 grams) chocolate malt 325 – 375 °L (such as Briess)
- 3 oz. (84 grams) black patent or similar malt (such as Briess at 475–525 °L or Weyermann dehusked Carafa III at 490–560 °L)
- 0.8 lb. (0.36 kg) brewers corn syrup (such as Briess)
- 1 teaspoon Irish moss
- 6.63 AAU Fuggles hops(bittering) 1.3 oz. of 5.1% alpha acid)
- 1 oz. (28 grams) East Kent Goldings (flavor hops)
- 1 package of Irish ale yeast such as Wyeast 1084 or White Labs WLP004
- 1 cup DME or corn sugar (bottling)

Step by Step

Crack the 1 lb. (0.45 grams) of specialty grains (roasted barley, chocolate malt, and black/roasted malt combined) and place them in a muslin bag. Immerse the bag in 1–2 gallons (3.8-7.6 L) of cold water. Heat slowly for 30 minutes to about 180 °F (82 °C). Steep for another 30 minutes before lifting out the bag. Rinse the bag slowly with 2–3 cups of cold water, but do not squeeze it. Discard the bag. Combine the grain tea and enough water in the kettle to make three gallons. Bring to a boil. Turn off the heat to avoid scorching and add the LME and the syrup. Stir and bring to a boil. Add the bittering hops. Continue to boil for about one hour. Add the flavor hops and boil for another 15 minutes. Add Irish moss about 5 minutes before shut-down. Top the kettle off with enough cold water to reach the target gravity of approximately OG 1.040 (10 °P). Follow all-grain instructions for heat exchanging, fermenting and bottling.

Dry Cork Stout

(5 gallons/19 L, extract only)

OG = 1.040 FG = 1.008
ABV = 4.1%

Ingredients

- 4.0 lbs. (1.8 kg) Mountmellick hopped Irish stout malt extract
- 0.66 lbs. (0.3 kg) plain dark malt extract for ales (such as Alexander's, Briess, Coopers, Glen Brew, John Bull, or Muntons)
- 0.8 lb.(0.36 kg) brewer's corn syrup (such as Briess)
- 4 fl.oz. (120 mL or 140 grams) SINAMAR liquid malt color
- 1 teaspoon Irish moss
- 2.55 AAU Fuggles hops (bittering) 0.5 oz. of 5.1% alpha acid)
- 1 oz. (28 grams) East Kent Goldings (flavor)
- 1 package of Irish ale yeast such as Wyeast 1084 or White Labs WLP004
- 1 cup DME or corn sugar (bottling)

Step by Step

Heat 3 gallons (11.4 L) of water and turn off heat to avoid scorching. Add two LMEs, syrup and liquid malt color. Stir and bring to a boil. Add bittering hops. Continue to boil for an hour. Add flavor hops and boil for another 15 minutes. Add Irish moss about 5 minutes before shut-down. Top kettle off with enough cold water to reach the target gravity of about OG 1.040 (10 °P). Follow the all-grain instructions for heat exchanging, fermenting and bottling.

pale grist be an ale malt (such as Briess pale ale malt), but I have also made delicious dry stouts with pale lager malts (such as Weyermann Pils malt). For the opaque color of the dry stout, skip all malts in the middle of the color spectrum and go straight for the darker chocolate and black patent malts. I like Briess chocolate malt for a nice roasted, chocolate flavor as well as Briess roasted malt for a hint of coffee. There are also great malts from the U.K. like Crisp, Hugh Baird and Simpsons. If you like a touch of burnt flavors, Briess black malt works well. If you are like me and enjoy the deep color of black patent malt but not some of the bitter notes that are normally associated with such heavily roasted malts, try Weyermann de-husked Carafa Special Type III malt. Any of these malts, individually or in combination, contribute plenty of darkness and complexity of flavor, even in small quantities, without adding excessive amounts of residual sweetness.

The importance of a high proportion of fermentable sugars in dry stouts explains why the most common commercial Irish stouts also contain a significant portion — perhaps as much as 20 to 30 percent — of unmalted adjuncts. These may be based on barley, rice, corn or a combination of the three. Once subjected to a vigorous and prolonged boil in a cereal cooker, adjunct starches break down and change mostly to simple, fermentable sugars, which in turn promote a dryer finish. (The boiling does not actually hydrolyze the starch, it gelatinizes the starch so that malt enzymes can break the molecules down.)

Fortunately for the all-grain homebrewer, who may not wish to mess with cooking cereals, there are un-malted, pregelatinized barley products (such as Briess Pregelatinized Barley Brewer's Flakes) on the market. Such products are made by steam-cooking the raw grains until the starches are gelatinous and soft. The adjuncts are then rolled and dried into flakes. Because flakes of barley, rice or corn lack enzymes, they need to be mashed with enzyme-rich pale malt. However, they must not be milled! Cooked, dried adjunct flakes can become overly powdery when milled and cause lautering and extract efficiency complications. Briess insists that their adjuncts not be milled.

A Few Tips For Extract Brewers

Dry stouts are more identified with Ireland than any other place in the world. This simple generalization is important for the extract brewer who usually does not know from which malt variety the liquid in the can is made. The safest guideline for selecting a liquid malt extract for a dry extract stout, therefore, is to pick one that is explicitly marketed for Irish stouts. Unfortunately, all the canned stout extracts that I know of come pre-hopped. This requires a compromise. For authenticity's sake, I suggest using an entire can of Mountmellick hopped Irish stout malt extract, augmented by some Briess brewer's corn syrup for dryness and some unhopped dark malt, such as Coopers, Glen Brew, Briess, John Bull, or Muntons (for quantities see our recipe). This gives you a chance to keep control over at least some of the hopping in this brew. The hop quantities specified in the all-extract recipe, therefore, may strike you as low, but they take into account that you are already getting part of your bittering from the can.

As for adjuncts, there are syrup preparations for extract brewers that are made from rice or corn and serve the same function as adjunct flakes in the mash tun. Use them in the kettle like liquid malt extract. These syrups are very pale though, and thus lighten the beer. The color of a dry stout made from our combination of extracts and adjunct syrup will be much lighter than the target 70 SRM that we prefer to achieve — especially in the absence of the dark and black malts that are part of the all-grain brewer's mash. Given the variability of the color values of dark LMEs, and given the fact that extract manufacturers rarely disclose the color values on their labels, any assessment of the true color is more of an educated guess. I suspect that the beer made with our recipe has a color value of approximately 45± 10 SRM. You can either accept this "brightening" of your stout or you can use a completely natural preparation called SINAMAR made by Weyermann. SINAMAR is a liquid malt coloring agent made exclusively from de-husked roasted malt. It darkens beer without affecting its flavor. To figure the quantity of this liquid malt color, let's assume we want to darken the beer by 20 SRM. To make five gallons of beer 1 SRM darker, you need approximately 0.2 fluid ounces or 0.25 ounces avoirdupois of this liquid malt color. For those who "think metric," these values are 6 mL or 7 grams for 19 liters.

Lower Mash Temperatures Make Simpler Sugars

The all-grain brewer has a certain control over the types of sugars that are produced in the mash tun, provided there are not too many dextrin, caramel and crystal malts in the grain bill. The key process variable in this context is the diastatic conversion temperature.

For dryness in the finished beer, it is essential that you select a sugar rest temperature that favors beta-amylase activity. Beta-amylase produces only fermentable sugars but leaves behind non-fermentables that the alpha-amylase must break down (in concert with the beta-amylase) to produce the driest beers.

Alpha-amylase, by contrast, produces complex sugars that are either not fermentable or need to be reduced to become fermentable. The activity levels of these diastatic enzymes are tied to temperature as well as mash viscosity (thickness of mash) and pH-levels.

Here are the relevant temperature thresholds that we must keep in mind for activating the correct amylase during the mash:

At 104 °F (40 °C) beta-amylase show the first signs of activity.
At 140 °F (60 °C) alpha-amylase show the first signs of activity.
At 149 °F (65 °C) beta-amylase show peak activity.
At 158 °F (70 °C) beta-amylase are denatured.
At 162 °F (72 °C) alpha-amylase show peak activity.
At 176 °F (80 °C) alpha-amylase are denatured.

This means that, if we keep our mash temperature roughly between 140 and 150 °F (60–65 °C), there will be mostly simple-sugar production and very little complex-sugar production. Many brewers, therefore, prefer to make a dry stout using a single-infusion mash at a temperature of only 148 °F (64 °C). Alpha-amylase reach their peak level of activity at a higher temperature than beta-amylase, but there is an overlap in activity between beta and alpha-amylase in the temperature range between 140 °F and 158 °F (60–70°C). Any complex sugars produced by alpha-amylase in that range, therefore, still has a chance to be reduced to fermentable sugars by beta-amylase. Some 80% of amylase activity occurs during the first 15 minutes when the mash is at the correct temperature. During that time we want to give beta-amylase enough time to break down the sugars produced by alpha-amylase and must give the dry-stout mash a long saccharification rest of at least one hour.

Once we leave our saccharification rest temperature of 148 °F (64 °C), however, and start pushing the mash past 158 °F (70 °C) on our way up to the mash-out temperature, we must ensure that the temperature rise is quick so as not to create unfermentables by alpha-amylase. You want to get through the main active temperature band for beta-amylase as quickly as possible to avoid the generation of dextrins. By reaching the temperature plateau for denaturing alpha amylase rapidly (at the temperatures indicated) you achieve this objective. Initiate a sparge with near-boiling water to send the mash as rapidly as possible to about 172 °F (78 °C) and then reduce the sparge water temperature to about 180 °F (82 °C) to maintain the mash-out temperature. (The reduction in sparge water temperature may vary with the thermal characteristics of your mash setup.)

Maintaining the mash at about 172 °F (78 °C) during sparging retards (though it does not stop) alpha-amylase activity. However, you do NOT want to push the mash past 176 °F (80 °C), the temperature at which alpha-amylase are denatured.

Hops and Yeast

You need a soft hop to provide a gentle note to the slightly astringent maltiness of a dry stout, but you should never over-hop a stout just to create a contrast to the brew's roastiness. If you stick with tradition, you cannot go wrong. The combination of Fuggles for bittering and East Kent Goldings for flavor works very well. Using Galena for bittering and Willamette for flavor yields an interesting American variation on the dry stout theme.

Because we want a dry but complex brew, select a yeast that is known as a good work horse to the finish and leaves a slightly buttery note, such as Wyeast 1084 Irish or White Labs WLP004 Irish.

Quantity Calculations

The amounts in our all-grain recipe for dry stout have been calculated for a system with an extract efficiency of approximately 65%. If your system's efficiency is different, our recipe will give you proportionally more or less wort at the specified target gravity. In this case you must also adjust all hops amounts proportionally to your actual yield. Knowing your system's efficiency, you can adjust the grain amounts proportionally up or down in advance to obtain a yield of exactly five gallons. ■

Horst Dornbusch writes the Style Profile column in every issue of Brew Your Own.

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mardi gras CLONES

The season of Carnival is upon us. The celebration begins January 6th and stretches to the height of Mardi Gras, Fat Tuesday, on February 24th. Unfortunately, not everyone can catch the infamous krewe parades of New Orleans or share in the festivities on Bourbon Street, but that doesn't mean we have to miss out on all the favorite New Orleans microbrews. Thanks to authors Mark and Tess Szamatulski, and former *BYO* columnist Dawnell Smith, you can now clone Abita Amber, Abita Turbo Dog and Dixie Blackened Voodoo Lager — and hey, isn't sitting back with a good Louisiana-themed homebrew sporting your purple, green and gold beads really the next best thing to the French Quarter? *Laissez Les Bon Temps Rouler* (let the good times roll)!

ABITA TURBODOG

(5 gallons/19 L, extract with grains)
OG = 1.054 FG = 1.014 IBU = 32–34

Ingredients:

- 5 lbs. (2.25 kg) Muntons unhopped light dry malt extract
- 1.25 lbs. (0.56 kg) crystal malt (Schreier crystal 100 or Muntons crystal dark)
- 0.50 lbs. chocolate malt (Schreier chocolate or Muntons chocolate)
- 7 AAUs Chinook hop pellets (0.6 oz. of 12% alpha acid)
- 5 AAUs Willamette hop pellets (1.25 oz. of 4% alpha acid)
- 6 AAUs Willamette (1.5 oz. at 4% alpha acid)
- White Labs WLP004 (Irish Ale) or Wyeast 1084 (Irish Ale) yeast
- ¾-cup corn sugar or 1 cup unhopped dried malt extract

Step by step

Heat specialty grain in 2.5 gallons (9.5 L) of water at 152 °F (52 °C) for 45 minutes. Remove grains, add dry malt extract, bring to a boil and add 1 oz. (28 grams) Chinook hops.

Boil for 85 minutes and add 1.25 oz. (35 grams) Willamette hops. Boil five minutes and remove from heat. Hold wort on the stove without heat for a rest, then add 1.5 oz. (35 grams) Willamette hops. Boil five minutes and remove from heat. Hold wort on the stove without heat for a rest, then add 1.5 oz. (35 grams) Willamette hops and let the wort settle for 15 minutes. Bring up to 5.25 gallons (20 L) with chilled, preboiled water.

Cool to 60 °F (15.5 °C), add yeast, aerate and let ferment for five to six days at 55–58 °F (13–14 °C), or at the lower end of your yeast manufacturers recommended fermentation temperature (at about 1.016). Cool to around 45 °F (7 °C) and age for one week before racking into bottles or kegs.

All-grain option:

Cut out DME and use 7.5 lbs. (3.4 kg) pale malt (Schreier special pale or Muntons pale). Heat 2.5 gallons (9.5 L) to 160 °F (71 °C) in a brew pot and slowly mix in milled malt. Hold at 152 °F (67 °C) for 45 minutes, then heat the thick mash to 172 °F (78 °C) and hold for five minutes. Transfer to lauter unit and run-off first wort (should hit 1.070). Sparge with 3.75 gallons (14.25 L) at 172 °F (78 °C). Bring wort to boil and proceed as above.

– Dawnell Smith

ABITA AMBER

(5 gallons/19 L extract with grains)
OG = 1.043 FG = 1.010
SRM = 11 IBU =18 ABV = 3.4%

Ingredients:

8 oz. (226 g) U.S. 40 °L Crystal malt
4 oz. (113 g) Munich malt
1 oz. (28 g) U.S. chocolate malt
4 lbs. (1.8 kg) Alexander's pale malt extract syrup
1.75 lbs. (793 g) Muntons extra light dried malt extract
1/3 oz. (9 g) Chinook at 12 % AA (4 HBU) (bittering hop)
1/4 oz. (7 g) Crystal (flavor hop)
1 tsp. (5 mL) Irish Moss
1/4 oz. (7 g) Perle (aroma hop)
Wyeast 2308 (Munich lager) yeast (ferment at 47–52 °F/ 8–11 °C for four weeks then at 57–62 °F (14–17 °C) for the remainder of fermentation.)
Wyeast 2206 (Bavarian lager) yeast (ferment at 47–52 °F/8–11 °C)
1.25 cups (300 mL) Muntons extra light dry malt extract (for bottling)

Step-by-step

Heat 1 gallon (3.8 L) of water to 155 °F (68 °C). Add Crystal, U.S. 40 °L Munich and U.S. chocolate malts. Remove the pot from the heat and steep at 150 °F (66 °C) for 30 minutes. Strain the grain water into the brew pot. Sparge the grains with 1/2 gallon (1.9 L) of 150 °F (68 °C) water. Bring the water to a boil, remove from the heat and add Alexander's pale malt extract syrup, Muntons extra light dried malt extract and Chinook bittering hops. Add water until the total volume in the brew pot is 2.5 gallons (9.5 L). Boil for 45 minutes then add: Crystal flavor hops and Irish Moss. Boil for 10 minutes and Perle aroma hop. Boil for five minutes. Remove the pot from the stove and chill the wort for 20 minutes.

Strain the cooled wort into the primary fermenter and add cold water to obtain 5 1/8 gallons (19.5 L). When the wort temperature is below 80 °F (26.6 °C) pitch the yeast. Keep the primary fermenter at 60–62 °F (16–17 °C) until fermentation begins (approximately one day). Move the primary fermenter to 47–52 °F (8–11 °C) and ferment for seven days or until fermentation slows. Siphon the wort into the secondary fermenter (5 gallon glass carboy). Bottle when fermentation is complete, target gravity is reached and beer has cleared (approximately five weeks) with the 1.25 cups (300 mL) Muntons extra light dry malt extract (boiled for 10 minutes in 2 cups (473 mL) of water). Let prime at 70 °F (21 °C) for approximately four weeks until carbonated, then store at cellar temperature.

Partial-mash Method:

Mash 2.25 lbs. (1.02 kg) U.S. 2-row pale malt and the specialty grains at 150 °F (65.6 °C) for 90 minutes. Then follow the extract recipe omitting 1.75 lbs. (0.79 kg) Muntons extra light dry malt extract at the beginning of the boil.

All-Grain Method:

Mash 7.5 lbs. (3.4 kg) U.S. 2-row pale malt with the specialty grains at 122 °F (50 °C) for 25 minutes then at 140 °F (65.1 °C) for 90 minutes. Add 3.3 HBU (18 % less than the extract recipe) of bittering hops for 60 minutes of the boil. Add the flavor hops, Irish Moss and Aroma hops as indicated by the extract recipe.

DIXIE BLACKENED VOODOO LAGER

(5 gallons/19 L, extract with grains)
OG = 1.056 FG = 1.013 IBU = 25
SRM = 27 ABV = 5.4%

Ingredients:

0.5 lbs. (0.23 kg) U.S. 80 °L crystal malt
1 oz. (28 g) U.S. black malt
2 oz. (56 g) U.S. chocolate malt
4 lbs. (1.8 kg) Alexander's pale malt extract syrup
2.75 lbs. (1.25 kg) Muntons light DME
0.33 lbs. (0.15 kg) rice solids
1.5 oz. (42 grams) Mt. Hood 4.3% AA (6.5 HBU) (bittering hop)
0.25 oz. (7 grams) Cascade (flavor hop) at 45 minutes
0.25 oz. (7 grams) Mt. Hood (flavor hop) at 45 minutes.
1 tsp. (5 mL) Irish moss
0.25 oz. (7 grams) Cascade (aroma hop) at 55 minutes
0.25 oz. (7 grams) Mt. Hood (aroma hop) at 55 minutes
Wyeast 2035 (American lager) or Wyeast 2007 (Pilsen lager) yeast
0.75 cup (180 mL) corn sugar

Step by step:

Crush and steep crystal, black and chocolate malt in ½ gallon (1.9 L) 150 °L (65.5 °C) water for 20 minutes. Strain the grain water into your brew pot. Sparge the grains with ½ gallon (1.9 L) water at 150 °F (65.5 °C). Add water to the brew pot for 1.5 gallons (5.7 L) total volume. Bring the water to a boil, remove the pot from the stove, and add Alexander's pale malt syrup, Muntons light DME, rice solids, and of Mt. Hood hops for bittering. Add water until total volume in the brew pot is 2.5 gallons (9 L). Boil for 45 minutes and add flavor hops, and Irish moss. Boil for 10 minutes then add aroma hops. Boil for five minutes, remove pot from the stove and cool for 15 minutes. Strain the cooled wort into the primary fermenter and add cold water to obtain five gallons (18.9 L). When the wort temperature is under 80 °F (26.6 °C), pitch your yeast. Ferment in the primary fermenter five to seven days or until fermentation slows, then siphon into the secondary fermenter. Bottle when fermentation is complete with corn sugar.

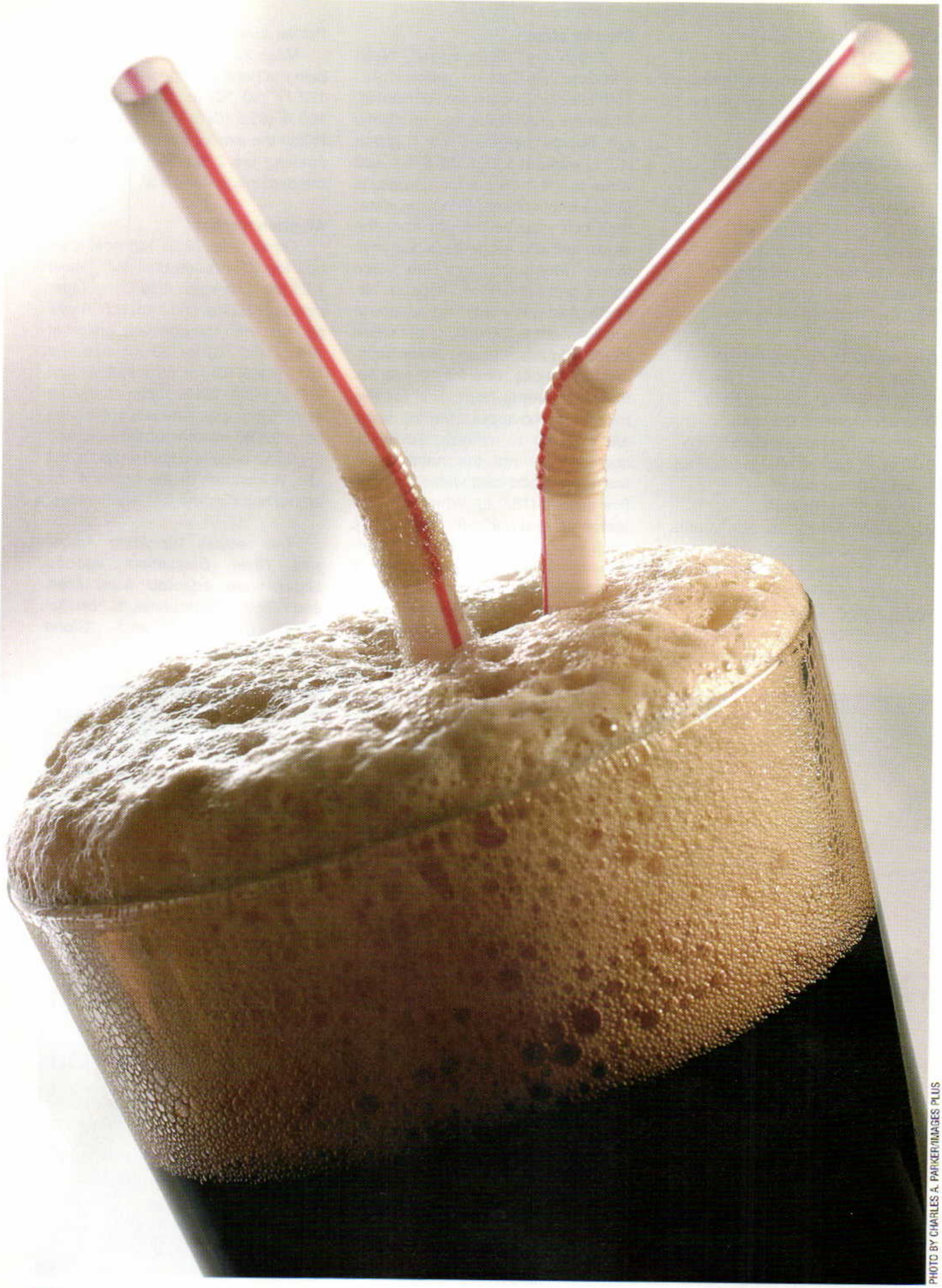
Partial mash:

Mash 2.5 lbs. (1.1 kg) U.S. 2-row pale malt and the specialty grains at 122 °F (50 °C) for 30 minutes and 150 °F (65.5 °C) for 60 minutes. Then follow the extract with grains recipe, omitting the 2 lbs. (0.9 kg) DME at the beginning of the boil.

All-grain method:

Grind ½ lb. (0.23 kg) rice, then boil for 20 minutes until soft. Mash 7.25 lbs. (3.3 kg) British 2-row lager malt and 2.5 lbs. (1.13 kg) U.S. 6-row ale malt with the specialty grains at 122 °F (50 °C) for 30 minutes and 151 °F (66 °C) for 60 minutes. Add 4.7% HBU (31% less than the extract with grains recipe) of bittering hops for 90 minutes of the boil. Add the flavor hops and Irish moss for the last 15 minutes of the boil and the aroma hops for the last five minutes. ■

The recipes for Abita Amber and Dixie Blackened Voodoo Lager were adapted from Mark and Tess Szamatulski's books, "Beer Captured," and "Clone Brews," respectively.



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Milk Stout: It Does A Body Good

by **Glenn BurnSilver**

WE BEGIN with that age-old question of which came first, milk or stout?

While that answer may be obvious, what actually remains a mystery is exactly who first came up with the idea of adding milk to beer. This was actually a common practice — adding whole milk to beer and stouts in particular — that began in the United Kingdom during the 1800s, back when stouts were actually called "stout porters." Milk beers were served at lunchtime to laborers for added strength to get through the day. As strange as it seems, it actually makes perfect sense as many cultures, such as the Maasai in Kenya, rely on milk as a staple food. The beer in this case was an added bonus.

In time, brewers began experimenting by adding milk directly to the fermentation stage and began touting these "milk stouts" as restorative beverages. Many claimed that every glass contained "the energizing carbohydrates of 10 ounces of pure dairy milk," according to British historical records. By the turn of the 20th century, doctors even went so far to prescribe milk stouts as the cure for various ailments including to nursing mothers to increase their milk production.

However, the British government banned use of the term milk stout in 1946 to stem such unproven claims and to prevent any chance of the sweet beer finding its way into children's hands. By that time there was not actually any milk in milk stouts as brewers had discovered how to produce and use lactose — or milk sugar — in the beer. One of the few survivors of that era is Mackeson's XXX Stout, which has been produced since 1907. Mackeson's XXX Stout was originally called Mackeson's Milk Stout before regulations were enacted. A milk churn still adorns the label.

A simple definition

The characteristics of milk stouts, also called cream stouts, are only subtly different from a more traditional dry stout, such as Guinness. There are the rich, chocolate roasted essences with hints of coffee and caramel present in both styles, but the milk sugar also balances the hoppy, and sometimes, roasted bitterness inherent in stouts. Since lactose is unfermentable by brewers yeast, it is used primarily to create a fuller-bodied product with heightened mouthfeel as well as add sweetness. The result is a silky smooth, creamy and slightly sweet — depending on the lactose content — brew that is very palatable, even for non-stout drinkers.

"It is an easier drinking beer than a dry stout," says Lancaster (Pa.) Brewing Company Brewmaster Christian Heim of his brewery's award-wining Milk Stout. "Use Guinness as an example. A lot of people are afraid of Guinness because it is dry, a little bit astringent. We've had a lot of success with women drinking the beer. We ask: 'Do you drink coffee? Then think of this as a new coffee flavor sensation.' I mean, if you like coffee, you'd like stout, and if you put milk or sugar in your coffee you're going to really like milk stout. The flavors are similar and are going to appeal to similar people."

Scott Christoffel, brewmaster at Lefthand Brewery in Longmont Colorado agrees, noting their milk stout began as a seasonal experiment, but has become one of the brewery's best selling products.

"A lot of people get scared when they see a beer that dark," he says, "but milk stout is an exceptionally smooth version of stout. It has to do with that lactose thing that adds body to the beer. It also takes the bitter edge off because with roasted barley a lot of people who don't like a real big stout will definitely like this beer because it is rounder and not too bitter."

Milk stouts are not too common in the United States, or the world really, with only a couple handfuls being produced. It takes a sharp eye to spot them among the hundreds of beers being marketed these days. Some examples of this traditional English-style sweet stout available in the United States include Watney's Cream Stout, Samuel Adams Cream Stout, Tennent's Milk Stout, Bell's Special Double Cream Stout, Castle Milk Stout, Saranac Mocha Stout, Hitachino Nest Beer Sweet Milk Stout and, of course, those stouts mentioned above.

A Blizzard of Stouts

With all of their flavor, stouts are a great platform for other beer flavors. If milk stout is not your bag, try one of these:

Ragnarok Imperial Stout

(5 gallons/19 L, partial mash)

OG = 1.111 FG = 1.028

IBU = 25 SRM = 38 ABV = 10.7%

In Norse mythology, Ragnarok is the final confrontation between the gods and the giants. When the apocalypse arrives, this beer — big as Thor, great as Odin — is what they will be selling in the stands. Skol!

Ingredients

2.0 lbs. (0.91 kg) 2-row pale malt
1.33 lbs. (0.60 kg) roasted malt
3.75 lbs. (1.7 kg) Briess dried malt extract
7.0 lbs. (3.2 kg) liquid malt extract (step 2)
1.5 lbs. (0.68 kg) liquid malt extract (for "kicker")
10 AAU Fuggles hops (bittering) (2.0 oz./57 g of 5% alpha acids)
Wyeast 1728 (Scottish Ale) or White Labs WLP028 (Edinburgh Ale) yeast (1–2 qt./~1–2 L starter)
Wyeast 3787 (Trappist High Gravity) or White Labs WLP099 (Super High Gravity Ale) yeast (for secondary fermentation)
0.75 cups corn sugar (for priming)

Step by Step

Brew using (a variant of) the Texas Two-Step method (*BYO*, October 2003). **Step 1:** Partial mash crushed grains in 1.25 gallons (4.7 L) of water at 150 °F (66 °C) for 45 minutes. Rinse grains with 1.25 gallons (4.7 L) of water at 168 °F (76 °C). Add dried malt extract and water to make 2.6 gallons (9.8 L) of wort. Bring wort to a boil and add bittering hops. Boil for 60 minutes, yielding 2.33 gallons (8.8 L) of wort. Chill wort, aerate and pitch yeast. Ferment at 68 °F (20 °C) overnight. **Step 2 (16–24 hours later):** Heat 2.33 gallons (8.8 L) of water to a boil and add 7 lbs. (3.2 kg) liquid malt extract. Maintain wort at 170 °F (77 °C) or above for 15 minutes. Chill wort to 68 °F (20 °C) and blend with previous wort. Aerate full, mixed wort thoroughly and continue fermenting at 68 °F (20 °C). **Add "kicker:"** After primary fermentation is complete, rack beer to secondary and add secondary yeast and "kicker." (Make kicker by dissolving 1.5 lbs. (0.68 kg) of liquid malt extract in 0.33 gallons/42 oz. (1.2 L) of water. Heat to 170 °F (77 °C) and hold for 15 minutes. Cool before adding to beer.) Let beer condition for one month before bottling. Let bottle condition for at least another two months.

Snowblind Cherry Vanilla Stout

(5 gallons/19 L, extract with grains)

OG = 1.064 FG = 1.016

IBU = 22 SRM = 53 ABV = 6.2%

Each year, the August Schell Brewery (New Ulm, Minnesota) releases their holiday seasonal under the label "Snowstorm." This beer is an amped up version of Schell's offering.

Ingredients

5.33 lbs. (2.4 kg) Muntons dried malt extract
0.66 lbs. (0.30 kg) chocolate malt
0.75 lbs. (0.34 kg) roasted barley
0.13 lbs. (58 g) black patent malt
6.1 lbs (2.8 kg) cherry puree (two 49 oz. cans of Oregon Fruit Products Cherry Puree (23 Brix))
2–4 vanilla beans
6.4 AAU Northern Brewer hops (0.85 oz./24 g of 7.5% alpha acids)
Wyeast 1968 (London ESB) or White Labs WLP002 (English Ale) yeast
0.75 cup corn sugar (for priming)

Step by Step

Steep grains in 1 gallon (3.8 L) of water at 153 °F (67 °C) for 45 minutes. Rinse with 0.5 gallons (1.9 L) of water at 168 °F (76 °C). Stir the dried malt extract into the grain tea, add water to make 3 gallons (11 L) and bring to boil. Add bittering hops and boil for 60 minutes. At knock out, add the cherries to the hot wort. Hold wort at 160–170 °F (71–77 °C) for 20–25 minutes. Chill wort to 75 °F (24 °C) and transfer to fermenter. Add water to make 5 gallons (19 L) of wort. Aerate and pitch yeast. (You should make a 0.5–2 qt. (~500–2000 mL) starter for this yeast strain.) Let ferment at 70–72 °F (21–22 °C) for 5–7 days, then rack to secondary for a week of conditioning. Add two vanilla beans (sliced down the center) at this point and let sit for three days. Sample beer and add more vanilla, if desired. Bottle with corn sugar and condition for three weeks.

All-grain option:

Replace DME with 9.88 lbs. (4.48 kg) of 2-row pale malt. Mash at 152–154 °F (67–68 °C) for 60 minutes.

Left of Lefse Extra-Dry Potato Stout

(5 gallons/19 L, all-grain)

OG = 1.038 FG = 1.008

IBU = 25 SRM = 27 ABV = 3.9%

A great, dry session stout made with potatoes as an adjunct. When mashed, the potatoes contribute sugars — but no flavor — to the beer. Don't know what lefse is? Uff da!

Ingredients

5.25 lbs. (2.4 kg) 2-row pale malt
0.75 lbs. (0.34 kg) flaked barley
0.88 lbs. (0.39 kg) roasted barley
4.66 lbs. (2.1 kg) Russet or Yukon Gold potatoes
6.7 AAU East Kent Goldings hops (1.33 oz./38 g of 5.0% alpha acids)
1/4 tsp yeast nutrients (15 min)
Wyeast 1028 (London Ale) or White Labs WLP005 (British Ale) yeast
0.75 cup corn sugar (for priming)

Step by Step

Prepare potatoes: Peel potatoes and cut into medium-sized cubes. Boil for 15 minutes until softened, then drain water and mash potatoes with a potato masher until they are of an even consistency. **Brew beer:** Stir mashed potatoes into crushed grains and mash in to 148 °F (65 °C). Mash for 60 minutes, stirring every 15 minutes. Recirculate for 10 minutes. Collect 4 gallons (15 L) of wort, add 1.75 gallons (6.6 L) of water and boil for 90 minutes. Add bittering hops with 60 minutes left in boil. Chill wort, aerate and pitch yeast. Ferment at 70 °F (21 °C). Bottle with corn sugar.

Make it yourself

But don't worry about finding it on store shelves. Creating milk stouts at home is "about as easy as it gets," says Christoffel. He recommends beginning with a sweet stout recipe, though a dry stout could also be used. The lactose will add body, but with an even more pronounced palate and fullness.

"(Milk stouts) are typically not very bitter, so you need to put in a portion of roasted barley, but make sure the portion of chocolate malt is twice as big," he explains. "The roast will be subtle and you'll get plenty of color. If you go heavy on the barley, it will actually be bittersweet. It is better to have more chocolate malt and just a nuance of roasted barley. I also think it works out really well when there is a decent amount of caramel in the beer which is probably going to lead you to this style anyway."

As for the lactose — which is a fine, granulated sugar — Christoffel is hesitant to say exactly how much Lefthand adds to their brew, but recommends a range between 5% and 13%. "I find it is best to stay within 5–13% lactose. Thirteen percent is extreme and 5% is a nuance," he says. "But I don't want to stop anyone from experimenting ... you could still use 2% and it would create an interesting nuance. It really is an interesting ingredient that could be an interesting additive, but I'd shoot for somewhere more to center."

Heim also recommends going easy on the lactose, at least at the beginning. While there is not a specific amount of lactose that would "ruin" a brew, too much sweetness can make any beer a little difficult to drink.

"I would caution about using too much lactose, which is easy to do," he says, noting that at Lancaster he adds approximately 5.5% lactose to his batches. "Lactose is one-sixth the sweetness of sucrose, which is table sugar, so it's not real sweet, but it definitely can overpower if you put in too much. The lactose is subtle, but it might become a little over the top in sweetness."

There are two schools of thought for adding the lactose, adding to the boil or during the primary fermentation. While both brewers agree that adding at either stage should provide the needed results, both add their lactose in the later stages of the boil. However, as with any homebrew, experimentation is in order. Some homebrew recipes add the lactose for the entire boil or just before the end of the boil. A few even add the lactose right before bottling.

Low in alcohol

The common misconception is that if a beer is a stout, it must be high in alcohol. Yet most, with the exception of imperial stouts, are actually in the 4–6% alcohol by volume (ABV) range. (Lancaster Milk Stout is 5.2%; Lefthand Milk Stout lands at 5.3% while Samuel Adams Cream Stout falls to 4.7%.) Higher gravity beers might not work well with the lactose, Christoffel says. Adding lactose will not change the alcohol content, only the beer's character and "I wouldn't recommend using it in an imperial stout recipe," he says. "There will be a conflict of flavors. The imperial stout has a rich body to begin with. The Plato is high already so there will be some residual extract. It would make the beer a little too sweetish because of the starting gravity. I'd say your really good results are going to be with a stout that has a gravity between 14–16 °Plato (SG 1.056–1.064). I wouldn't go much higher."

As mentioned, the lactose — though a sugar — is unfermentable by brewer's yeast, but can be consumed by certain strains of bacteria. Good hygiene and cleanliness of fermenters and equipment is essential to prevent contamination. The bacteria will certainly consume the lactose, drive up the alcohol content and eliminate most of the benefits to be gained by adding the lactose in the first place — plus it just might ruin the beer anyway.

Of course, the original question doesn't need to be answered, and we are no closer with the second, but one thing is clear — the combination of the milk and stout makes for a fine beer that is rich and creamy, easy on the palate and low enough in alcohol content to enjoy more than one.

And it just might be the cure for what ails you.

Cactus Milk Stout

(5 gallons/19 L, extract with grains)
OG = 1.065 FG = 1.022
IBU = 30 SRM = 53 ABV = 5.5%

Ingredients

5.6 lbs. (2.5 kg) amber liquid malt extract
1.0 lb. (0.45 kg) dark liquid malt extract
0.25 lb. (0.11 kg) wheat malt
0.50 lb. (0.22 kg) flaked barley
0.50 lb. (0.22 kg) flaked oats
0.75 lb (0.34 kg) Paul's stout malt
0.25 lb. (0.11 kg) American crystal malt (90 °L)
0.25 lb. (0.11 kg) Carapils malt
0.25 lb. (0.11 kg) Belgian Special B
0.50 lb. (0.11 kg) chocolate malt
0.25 lb. (0.11 kg) roasted barley
0.25 lb. (0.11 kg) black patent malt
1.0 lb. (0.45 kg) lactose
10 AAU Phoenix hops (1 oz./28 g of 10% alpha acids)
5 AAU Willamette hops (1 oz./28 g of 5% alpha acids)
1 tsp. gypsum
1 tsp. Irish moss
White Labs WLP001 (California Ale) yeast
0.75 cup corn sugar (for priming)

Step by Step

Put crushed grains in grain bag. Heat 2 gallons of water with gypsum to 165 °F (74 °C). Turn off heat and add grain bag. (Do not add grains to water above 165 °F (74 °C). Let temperature rest down to 155 °F (68 °C) stirring grain bag gently from time to time. Leave pot uncovered during this time and rest for 25 minutes. Slowly heat back up to 165–170 °F (74–77 °C) degrees and hold 5 minutes. Turn off heat. Remove grain bag and let drain. Do not squeeze grain bag! Rinse grains by slowly pouring 1 quart of hot tap water over top of grain bag. Add 1.5 gallons (5.7 L) of water, or 3.5 gallons (13 L0 if you are doing a 5-gallon (19-L) boil. Add malt extracts, including lactose and bring to boil. Add 0.5 oz. (14 g) Phoenix hops. After 30 minutes add second 0.5 oz. (14 g) of Phoenix hops and Irish Moss. After 50 minutes add Willamette hops. Boil for a final 10 minutes. Cool wort to 80 °F (27 °C) or cooler and pitch yeast. Ferment 10–14 days at 68–72 °F (20–22 °C). You can also go from primary to secondary after four days and leave in secondary 10 days.

Watney's Cream Stout Clone

(5 gallons/19 L, extract with grains)
OG = 1.063 FG = 1.020
IBU = 37 SRM = 39 ABV = 5.5%

Ingredients

3.3 lbs. (1.5 kg) John Bull unhopped dark extract syrup
3.0 lbs. (1.4 kg) Laaglander Light dried malt extract
0.5 lbs. (0.22 kg) Belgian Special B malt
0.5 lbs. (0.22 kg) Belgian Cara-Munich malt
0.5 lbs. (0.22 kg) Belgian roasted barley
0.5 lbs. (0.22 kg) Belgian roasted malt
0.5 lb. lactose (at bottling)
0.25 tsp. Burton water salts
9 AAU Cascade hops (2.25 oz./64 g of 4% alpha acids)
4.6 AAU BC Goldings hops (1.15 oz./33 g of 4% alpha acids)
Wyeast 1056 (American Ale) yeast
0.5 cup corn sugar (for priming)

Step by Step

Crush the grains, place in a grain bag and steep them in 2.5 gallons (9.5 L) of 168 °F (76 °C) water for 20 minutes. Remove grain bag and bring grain tea to a boil. Stir in malt extract and resume boil, add Cascades hops once boil resumes. After 45 minutes, add the Goldings hops. (60 minute total boil.) Ferment at 68 °F (20 °C)

Mackeson's XXX Stout Clone

(5 gallons/19 L, extract with grains)
OG = 1.068 FG = 1.022
IBU = 36 SRM = 65 ABV = 5.9%

Ingredients

7.0 lbs. (3.2 kg) Coopers light syrup
1.0 lb. (0.45 kg) chocolate malt
1.5 lbs. (0.68 kg) black patent malt (uncracked)
12 oz. (0.34 kg) crystal malt
12 oz. (0.34 kg) lactose
10 AAU Kent Goldings hops (leaf) (2 oz./57 g at 5% alpha acids)
1 tsp. salt (15 mins)
1 tsp. citric acid (15 mins)
2.5 tsp. yeast nutrient (15 mins)
English Ale yeast
0.75 cup dried malt extract (for priming)

Step by Step

Place crushed crystal and chocolate malt — and uncrushed black patent malt — in a grain bag. Steep grains at 150 °F (66 °C) for 30 minutes. Add water and malt extract to the grain tea to make 3 gallons (11 L) and bring to a boil. Add bittering hops and boil for 60 minutes. Add lactose at knockout. Chill wort and pitch yeast. When fermented, prime with ¾ cup of dried malt extract and bottle.

Simply Sweet Stout

(5 gallons/19 L, all-grain)
OG = 1.041 FG = 1.015
IBU = 27 SRM = 29 ABV = 3.4%

Ingredients

6.5 lbs. (2.9 kg) pale malt
8 oz. (0.22 kg) crystal malt (80 °L)
6 oz. (0.17 kg) roasted black unmalted barley
7 AAU Kent Goldings hops (1.4 oz./40 g of 5% alpha acids)
12 oz. lactose (boiled for 10 minutes, added at kegging)
Wyeast 1028 (London Ale) yeast

Step by Step

Mash in with 2.5 gallons (9.5 L) of 170 °F (77 °C) water, aiming for 152 °F (67 °C) strike temperature. Hold 2 hours for conversion.Raise to 168 °F (76 °C) for mashout. Hold 10 minutes. Sparge with about 5 gallons (19 L) of water. Boil 1.5 hours. Add hops at 45 minutes. Ferment at 65 °F (18 °C), rack to secondary then age for several weeks. Keg with lactose.

Doug Rhoades' Milk Stout

(5 gallons/19 L, all-grain)
OG = 1.072 FG = 1.023
IBU = 47 SRM = 30 ABV = 6.3%

Ingredients

7.9 lbs. (3.6 kg) 2-row pale malt
1.1 lbs. (0.5 kg) wheat malt
1.5 lbs. (0.91 kg) crystal malt (90 ° L)
1.0 lbs. (0.45 kg) Carapils malt
5 oz. (0.14 kg) black patent malt
0.75 lbs. (0.34 kg) roasted barley
1.0 lbs. (0.45 kg) flaked oats
0.5 lb. (0.22 kg) flaked rye
1 lbs. (0.45 kg) lactose (30 min.)
1 tsp. Irish moss (15 min.)
11 AAU Galena hops (90 min.) (1 oz./28 g at 11% alpha acids)
2 AAU Willamette hops (10 min.) (0.5 oz./14 g of 4% alpha acids)
Irish Ale yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 122 °F (50 °C) for 20 minutes, 152 °F (67 °C) 60 minutes and 167 °F (75 °C) for 10 minutes. Boil for 90 minutes. Ferment at 68 °F (20 °C). Bottle with corn sugar. ■

CHEAP

PHOTOS COURTESY OF PAULA CONN

and easy batch sparging

by **Denny Conn**

Get big results on a small budget by building a simple mash tun and learning how to batch sparge

Some homebrewers aspire to go pro. Some like to use professional style systems and techniques for their homebrewing endeavors. Some get their kicks from designing fancy automated systems for their brewing. Not me; I take a simple, hands-on approach with my brewing. For me, it's cheap and easy batch sparge brewing. In this article, I'll show you the technique and explain how to build an inexpensive mash/lauter tun for batch sparging.

What is Sparging and How Do You Do It?

Sparging is rinsing the grain bed with water to extract as much of the sugar as possible. For our purposes, we'll specify that sparging begins only after the runoff of the sweet wort from the mashtun has begun. There are several different forms of sparging.

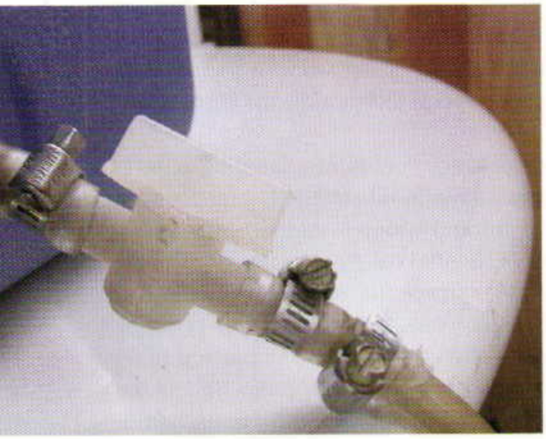
Fly Sparging Most brewers practice continuous sparging. This is also called on the fly or fly sparging. In this method, after recirculation the wort runoff is begun and water is added to the lauter tun at the same rate as wort is runoff. With fly sparging, it's important to collect wort slowly to extract the maximum amount of sugar. For fly-sparging homebrewers, wort collection typically takes 60–90 minutes. Lauter design is also highly important in fly sparging. Your lautering system must allow no channeling or the sparge liquor will "drill" straight down through the grain bed in only one or two locations and leave the rest of the mash unrinsed.

Because the runoff may take an hour or more, many brewers do a mashout — an addition of near-boiling water to raise the temperature of the grain bed to around 168 °F (76 °C). The mashout reduces wort viscosity to improve run-off, but also denatures the enzymes and prevents further conversion from taking place while fly sparging is proceeding.

No Sparge Brewing As described by John Palmer in "Skip the Sparge" (May-June 2002), a no sparge brew has the entire volume of "sparge" water added to the mash and stirred in before any runoff has taken place. Since the additional water has been added to the mash before the runoff has begun, we can more properly think of it as a mash infusion, rather than a sparge addition — hence the name "no-sparge." Wort collection consists of just draining the mash tun and usually takes less than 10 minutes.

Batch Sparging Batch sparging is similar to partigyle brewing. In partigyle brewing, progressively weaker worts are run off from the lauter tun and each wort is made into a different beer.

With batch sparging, the runoffs (usually the first two) are combined into a single batch. After conversion, the sweet wort is recirculated as normal and the mashtun is completely drained as quickly as possible. This usually takes about 3–5 minutes. Next, an addition of sparge water is added. This water is stirred into the mash, allowed to rest for a few minutes, thoroughly stirred again and — after recirculation — is once more drained as quickly as the system will allow. The second batch usually takes about 3–5 minutes to collect. There are several advantages to batch sparging. A lautering setup that is inefficient when fly sparging will be more efficient when batch sparging because there are no "dead" spots in the grain bed. A mashout is seldom necessary (although it may be desirable) when batch sparging because the wort will be in the kettle more quickly and enzymes denatured by boiling. Batch sparging takes more time than no-sparge brewing, but less time than fly sparging.



A stainless steel braid (picture at right) separates the wort from the grains. It is made from a water supply line. A valve on the outside of the cooler (above) regulates the outflow of wort.

Formula

It is relatively simple to figure out how much water to add for each batch. Most of the following is drawn from and builds on the work of Ken Schwartz and Bob Regent. The main concept to understand is that, for the best efficiency, the runoff volumes from your mash and batch sparge should be equal. In order to do that, it's sometimes necessary to infuse your mash with extra water before the first runoff. To figure out the amount for your system, both of the following relationships must be satisfied:

$$R1 + I + S(1) + S(2) + \ldots + S(X) = V$$

AND

$$R1 + I = 0.5V$$

In the equations, R1 is the initial runoff volume. This equals the mash water volume minus the water absorbed by grain. (In my brewery, with my mill, this is 0.1 gallons of water per pound of grain. Your value may be different.) "S" is the batch sparge water volume; "V" is total boil volume (amount needed in kettle for boil) and "I" is the volume of water infusions for a step mash.

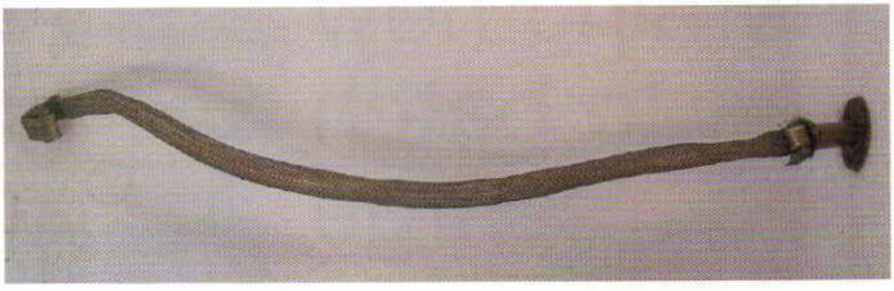
Assume a recipe with 10 lb. (4.5 kg) of grain, and that you need to collect 7 gallons (26 L) of preboil wort. A mash ratio of 1.25 qt./lb. (0.68 L/kg) would require 12.5 qt. or 3.125 gallons (12 L) of strike water. Based on an absorption of 0.1 gallons/lb., the mash would absorb 1 gallon (3.8 L) of water so we'd get 2.125 gallons (8.0 L) of water from the mash. Since we want to collect 3.5 gallons (13 L, or 50% of the boil volume), after the mash is complete we'd add 1.375 gallons/5.5 qt. (5.2 L) of water to mash tun before the first runoff. Stir the additional water in, let it sit for a few minutes, then vorlauf (recirculate the wort through the grain bed) until clear and start your runoff. After the runoff, we add 3.5 gallons (13 L) of batch sparge water. Stir it in, rest 10–15 minutes, stir again, then vorlauf and runoff as before. These two runoffs will give our preboil volume of 7 gallons (26 L) of sweet wort. Now, let's take a look at how to build the equipment and do a brew session!

Building the Mashtun

For the mashtun, you'll need a cooler. I prefer the rectangular ones. You'll also need a rubber bung for a minikeg, some ½ inch OD x ⅜ inch ID food grade vinyl tubing — long enough to reach from whatever you set your cooler on to the bottom of your kettle plus 6 inches. Finally, you'll need an inline nylon valve, and a length of water supply line (with a stainless steel braid for a jacket), and 3 hose clamps. The length of the water supply line doesn't really matter. I use one that's long enough to run the length of the cooler, but my experiments have shown that shorter ones seem to work as well.

Step by Step

1. Remove the spigot from the cooler. Usually, there's a nut on the inside of the cooler holding the spigot on. Unscrew that and the spigot should pop right out.



2. Remove the plastic insert from the hole in the minikeg bung and insert the bung into the spigot hole from the inside of the cooler. The beveled edge of the bung goes in first and the flange of the bung should end up flush with the cooler wall.
3. Cut off a 6-inch piece of the vinyl tubing and, from the inside of the cooler, insert it into the hole in the minikeg bung. Let a couple inches of tubing protrude from each side of the cooler.
4. Cut the threaded fittings off the water supply line. Pull the tubing out from the braid, leaving you with a hollow length of hose braid. Flatten the last inch or so of one end of the braid. Fold it over on itself 3 times to seal the end. Squeeze the fold with a pair of pliers to crimp it closed.
5. Slip a hose clamp over the end of the braid, and slip the braid over the end of the vinyl tubing inside the cooler. Tighten the clamp until snug, but don't squeeze the tubing shut!
6. Insert one end of the valve into the tubing on the outside of the cooler and secure it with a hose clamp. Slip another hose clamp over the end of the long piece of tubing, connect the tubing to the output side of the valve, and secure with the hose clamp.

That's it! You've built your cheap and easy mash/lauter tun! Now, let's brew some beer!

Your First Batch Sparge Beer

Let's walk through an actual brew session. This is from a 8-gallon (30 L) batch of altbier I brewed recently. Remember that the method can be used with any brewing system or equipment. The equipment you'll need is: your converted cooler mash tun, a pot to heat water in (5 gallons/19 L minimum recommended), a 1–2 qt. heatproof pitcher (preferably unbreakable), your regular brewing equipment — thermometer, boil kettle and whatever else you normally use.

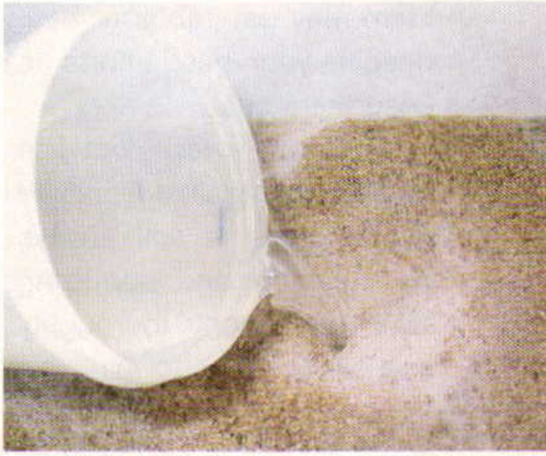
The things that you need to know to figure your water volumes are: Total grain weight, in this case, 19.3 lb.; strike water volume, in this case, 1.24 qt./lb or 6 gallons; absorption of water by grain, for me 10 lbs. (4.5 kg) of grain absorbs 1 gallon (0.45 L) of water. If you don't know your absorption volume, measure your first runoff volume the first few brews. By knowing how much water you put in and how much wort you got out, you can easily figure your absorption. Finally, we need to know our preboil volume — how much sweet wort you need to start with. For this batch, we want 10 gallons (38 L), which on my system will yield 8 gallons (30 L) of post-boil wort. OK, we're ready to brew!

1. Mash in with 6 gallons (23 L) of water for 1.25 qt./lb. I use the pitcher to pour water from the 7 gallon (26 L) kettle until the kettle is light enough to lift and pour the rest of the water in. I predict that the grain will absorb 1.9 gallons (7.2 L), so I should get just about 4 gallons (15 L) out of the mash.
2. Since I'd like to get 5 gallons (19 L) out of this runoff, I infuse with 1 gallon (3.8 L) of water at the end of the mash, before the first runoff. I add boiling water to get as close to the 168 °F (76 °C) mashout temperature as I can and stir it in.
3. After 10 more minutes, I begin to recirculate the mash by draining into the pitcher. I only open the valve partially at first, then as the runoff clears I open it up fully. With the hose braid, I usually only have to drain about a quart or so until it's clear. Keep draining and recirculating until the runnings are clear and free from pieces of grain.
4. Once the runnings clear, direct the runoff to your kettle, and slowly pour the contents of the pitcher back over the top of your mash.

5. Completely drain the mash tun as fast as your system will allow.
6. As the first runoff progresses, start heating your batch sparge water. In this case, we're going to heat 5 gallons (19 L) to about 185 °F (85 °C) to try to get to a grain bed temperature in the 165–168 °F (74–76 °C) range.
7. When the first runoff is done, add your second addition of sparge water. Stir the grain thoroughly, close the cooler, and let it rest for a few minutes.
8. After the rest, open the cooler and thoroughly stir the grain once again. Yep, you read that right! We want to get all the sugar into solution.
9. Go through the recirculation and draining process again, once more draining the cooler as fast as your system will allow.
10. Continue the brewing process as you usually do.

Congratulations . . . you've batch sparged! Like anything else in brewing, it may take a couple tries before you get everything figured out completely. But with batch sparging, you can brew all grain beers with a minimal investment in equipment and a pride in the hands-on fun of homebrewing. ■

Denny Conn lives near Eugene, Oregon with his IPA-loving wife, Paula.

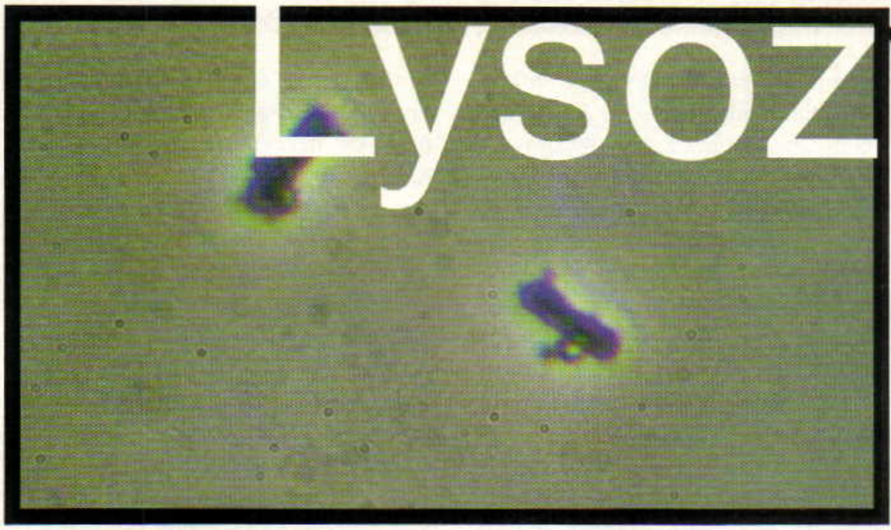


The stainless steel braid is attached to a tube inserted through the bung placed in the drain hole of the cooler (left). With batch sparging, water is added in stages then drained (above).

by **Jessica Just**

Lysozyme

PROTECT YOUR BEER FROM LACTIC ACID BACTERIA



The enzyme lysozyme disrupts the cell walls of the certain types of bacteria — including *Lactobacillus* and *Pediococcus*, common brewery contaminants. Once the cell walls are ruptured (or lysed), the bacterial cells burst open and spill their contents.

Nearly every homebrewer I know has had the disheartening experience of having a batch of beer go bad. I wish I could say that after 13 years of homebrewing (and a couple of degrees in food science) that every beer I brew is perfect, but I'd be lying. The truth is, potentially harmful microorganisms are everywhere and some of them may get into your beer despite your best efforts to keep them out.

A homebrewer's first line of defense against spoilage microorganisms will always be cleaning and sanitizing their equipment thoroughly and taking steps to minimize opportunities for airborne contaminants to fall into their wort or beer. There is, however, one new step a homebrewer can take to minimize the risk of contamination and spoilage — adding lysozyme.

Bacterial contamination can turn beer into a sensory nightmare. Bacteria cause turbidity, off odors and aromas, stuck or sluggish fermentation, acid production and even "ropiness" — the presence of gelatinous strands or blobs in beer.

Gram staining

Bacteria can be separated into two groups based on whether or not they react with Gram stain. Cells are classified as either "negative," if the bacteria is not stained by the Gram stain, or "positive" if it is.

In brewing, the most notable member of the Gram negative bacteria is *Acetobacter*, which is known for its ability to produce large amounts of acetic acid from alcohol.

The most common group of Gram positive bacteria associated with beer are collectively referred to as the lactic acid bacteria. Members of this group include *Lactobacillus* and *Pediococcus* and are called lactic acid bacteria because of their ability to produce lactic acid from sugar. Some lactic acid bacteria strains can also produce large amounts of acetic acid.

In general, the lactic acid bacteria ferment wort sugars and their growth is favored by anaerobic conditions. The most common off odors

This bacteria, from the genus *Lactobacillus*, is magnified 1000 times. These and other lactic acid bacteria can be destroyed by lysozyme. Other types of bacteria, such as *Acetobacter*, and yeast are not effected by this enzyme.

associated with these bacteria are sweet, butterscotch or honey notes created by diacetyl and related vicinal diketones. They grow optimaly at a pH of 5.5 and can survive at a pH as low as pH 3.0. (The pH of wort is typically 5.2–5.6; finished beer usually has a pH of 4.0–4.4.) They can grow over a wide range of temperatures and are alcohol tolerant. Hop resins can inhibit the growth of lactic acid bacteria but, because of adaptation, lactic acid bacteria strains encountered in the brewing environment are often resistant to hops. In short, wort and beer provide an ideal growth environment for lactic acid bacteria and can contaminate beer at nearly every turn.

The presence of bacteria is not always an unwanted occurrence. Indeed, beers such as lambics and other sour beers are dependent on the action of lactic acid bacteria as well as other microorganisms to develop a distinctive flavor profile. Additionally, bacterial growth can be used to brewers' advantage to naturally raise the acidity of the mash. If mash temperatures are held below 140 °F (60 °C), certain strains of heat tolerant lactic acid bacteria will produce lactic acid to effectively lower the mash pH. In winemaking, the growth of certain lactic acid bacteria is actually encouraged to carry out the "malolactic fermentation" which lowers wine acidity and provides microbial stability. The lactic acid bacteria are also responsible for food products as varied as sauerkraut, yogurt, cheese, salami and Thai fish sauce.

Lysozyme

Lysozyme is a well studied enzyme that can provide protection against a broad spectrum of Gram positive bacteria. It is used as a preservative in many food products including wine, tofu, cheese and sakè. The use of lysozyme in beer has only recently garnered attention and the applications in brewing, especially to the homebrewer, are numerous.

Alexander Fleming discovered lysozyme in 1922 when the scientific pioneer had a cold. He found that nasal drippings, which had dripped onto an agar plate, dissolved bacterial colonies. Fleming quickly determined that the antibacterial action was due to an enzyme effective against certain bacteria. Lysozyme is found abundantly in nature and is produced by bacteria, fungi, plants, birds, and mammals. Some viruses even contain the genetic code for lysozyme. Although lysozyme is found in high concentrations in human tears, commercial lysozyme is made from hen egg whites. (It takes over 3,000 pounds (1,360 kg) of egg whites to make 1 pound (4.5 kg) of lysozyme!)

Lysozyme Frequently Asked **Questions:**

How long does it take for lysozyme to work?

The rate of activity depends on many factors including temperature, pH, bacterial load and bacterial resistance. Even though lysozyme starts working immediately, it doesn't necessarily kill all the bacteria immediately.

At what temperature is lysozyme most active?

Lysozyme has optimal activity between 104–113 °F (40–45 °C), but will remain active up to 144 °F (62 °C). If the lysozyme is added at lower temperatures, the rate of activity will be dramatically slowed (but not stopped).

At what pH is lysozyme most active?

Lysozyme activity is highest from pH 3.5 to 7.0, although lysozyme is active over a pH range of 2.0–10.0.

Is lysozyme effective against all lactic acid bacteria?

No. A few lactic acid bacteria strains have shown resistance to lysozyme.

How long does lysozyme remain in beer?

The amount of residual lysozyme activity depends on the type of beer, timing of addition, initial bacterial population and the addition rate. Activity loss is greatest in darker beers, which contain more polyphenols. Research has shown that lysozyme is relatively stable in beer and will maintain at least 50% of its activity over a six month period when added to the final bottled product.

Does lysozyme affect the properties of beer?

According to research conducted by Dr. Mark Daeschel at Oregon State University, lysozyme has minimal effects on the physical and sensory properties of beer. Daeschel has shown that using lysozyme at a maximum rate of 200 ppm did not cause chill haze and did not affect foam stability. Lysozyme also has been shown to have no impact on the flavor or aroma of beer. Two sensory studies (also at OSU) were performed by both a regular consumer panel and a brewing industry professional panel. Niether panel could detect a difference in lysozyme treated beers from untreated beers.

Which fining agents react with lysozyme?

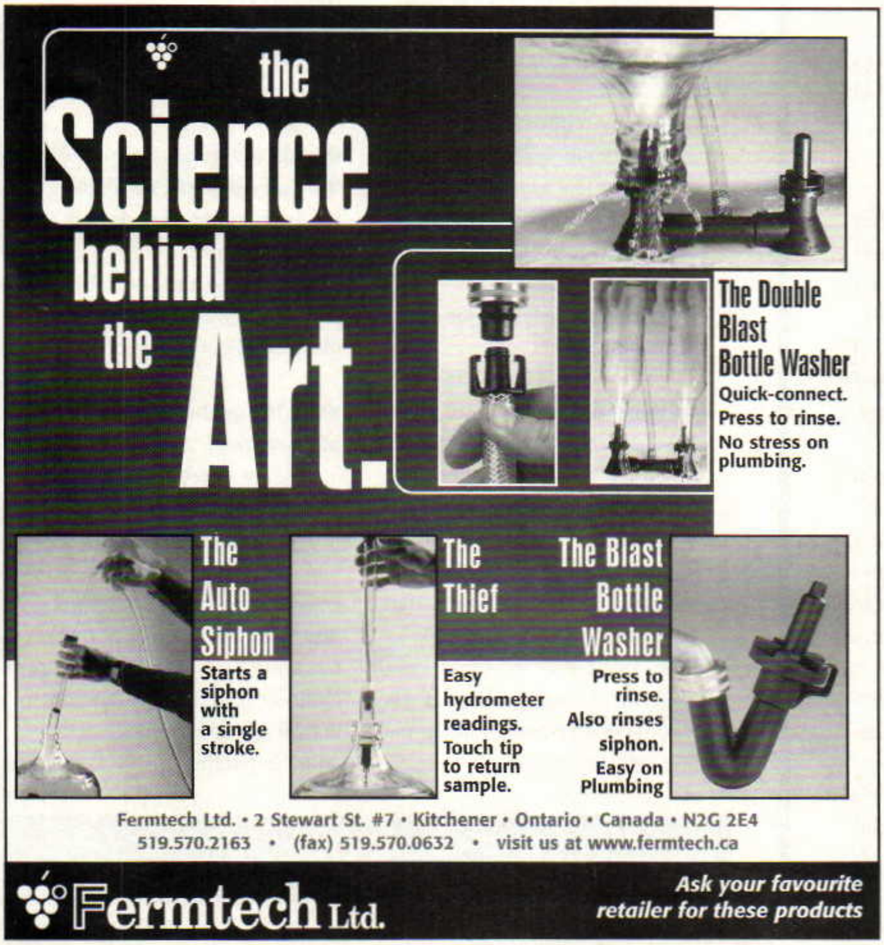
Lysozyme is a protein and will be removed by any fining agent that removes protein.

If I add the lysozyme before the boil will it still be active in the fermenting wort or in the final package?

No. Lysozyme loses all activity at 144 °F (62 °C) and so will be inactivated during the boil.

What is the shelf life of lysozyme?

When stored in a closed container at room temperature in a dry environment, the powder form of lysozyme retains 95% activity after five years. A rehydrated 22% stock solution lysozyme kept in the refrigerator at 39–41 °F (3.8–5.0 °C) has been shown to retain 90% activity after 12 months.



Lysozyme is effective against Gram positive bacteria (all lactic acid bacteria) due to its ability to specifically break down the cell wall structure of those microorganisms. Once the cell wall is broken, the cell breaks open and dies. Because the lysozyme is structure specific, yeast and Gram negative bacteria are completely unaffected by this antimicrobial.

The most appropriate places to include lysozyme in the brewing process are also the points where lactic acid bacteria have the opportunity to infect and spoil your beer.

Mashing

Certain heat-loving lactic acid bacteria associated with malt can contaminate the mash. However, the thermophilic bacteria (most often members of the genus *Bacillus*) are sensitive to hops and will not survive in hopped wort. All other lactic acid bacteria introduced in the mash should be killed in the boil. In a standard 60–90 minute mash in which wort separation occurs immediately after the mash, any bacterial growth will be inconsequential. However, if a mash is allowed to sit overnight and the temperature drops to around 140 °F (60 °C), the mash can become soured due to the action of lactic acid bacteria. Overnight mashers might wish to protect their mash with lysozyme. However, they would have to wait until the temperature dropped to 144 °F (62 °C) to add it, which probably would not be practical.

Wort cooling

As wort cools, it is vulnerable to contamination. For this reason, it is very important to cool wort rapidly and pitch with clean, active yeast as soon as possible. Perhaps the best time to add lysozyme is when the yeast is pitched (as pitching yeast is often the biggest source of contaminating bacteria). For this reason, it may not make sense to add lysozyme during wort cooling. If however, the wort is going to stand awhile before the yeast is pitched, lysozyme can be added to the cooling wort at a rate of 0.75 teaspoons per 5 gallons (19 L) once the temperature falls below 144 °F (62 °C).

Pitching

Pitching yeast, in terms of the number of contaminants introduced into the process, is the most significant reservoir of contamination. So, it stands to reason that this is one of the most opportune times to add lysozyme.

Yeast contamination is especially critical when using active dried yeast. Even though there have been huge advances in dried yeast technology, dried yeast is not produced under sterile conditions and there is great potential for introducing lactic acid bacteria into the fermentation via the yeast preparation.

A clean, active yeast slurry is also an excellent way to minimize spoilage. Many, perhaps most, homebrewers rely on using new cultures of liquid yeast with every brew. The yeast from liquid yeast producers should be free from contamination and safe to pitch. With appropriate care taken with cleaning and sanitation, homebrewers can make a healthy yeast starter with a minimum of unwanted microbial growth. Many homebrewers even report success in reusing yeast used for one or more fermentation cycles.

If yeast to be used (or reused) is suspect, lysozyme can be added to kill any lactic acid bacteria that are present. Lysozyme can be added to either active dried yeast or fresh yeast cultures. By mixing powdered lysozyme with active dried yeast, contaminating lactic acid bacteria can be inhibited upon yeast rehydration. Additions to both dried and fresh yeast will result in the presence of residual lysozyme activity in the fermenting wort. Just "a pinch" of lysozyme in a 2 qt. (~2 L) yeast starter or 1 cup yeast sample should do the trick.

There is one other way to clean up pitching yeast — acid washing. Acid washing is a technique used by some professional brewers to clean up yeast prior to pitching. It is a process whereby phosphoric acid is added to the yeast slurry to drop the pH. The intent is to kill off contaminating bacteria and weak yeast cells leaving only the strong viable yeast for pitching. However, acid washing can sometimes harm the yeast culture and fail to kill all the bacterial cells. This technique merely reduces the bacteria in number and should not be considered a cure. The practice of acid-washing yeast is probably out of reach for most amateur brewers. (And, for what it's worth, many professional brewers really dislike yeast washing).

Lysozyme addition to fresh yeast cultures can be used in place of acid-washing to "clean-up" the preparation. Keep in mind however, that — unlike acid washing — lysozyme only targets certain types of bacteria.

During fermentation

If microbial contamination is suspected, use lysozyme to prevent further growth of lactic acid bacteria. If lactic acid bacteria are present in fermenting wort, they probably originated in the pitching yeast rather than in the sweet wort. However, if open-fermentation vessels are used or equipment is not thoroughly cleaned, contamination at this stage can occur.

Also, if the primary fermentation stops or slows prematurely, use lysozyme to stabilize the wort while the fermentation is being restarted. Use 0.75–1.0 teaspoons of powder per 5 gallons (19 L) of wort.

In finished beer

Lysozyme can be added to the final product. Research has shown that a lysozyme addition of 150 ppm is high enough to inhibit sensitive bacteria and achieves good maintenance of activity over time with very little physical changes to the beer. The addition rate here is around 0.75 teaspoons of powder per 5 gallons (19 L) of beer.

In the prevention of unwanted microbial growth in wort and beer, nothing replaces brewhouse cleanliness and sanitation. With proper techniques, it is possible to brew clean, unspoiled beer batch after batch. However, microorganisms are everywhere and homebrewers frequently worry about the possibility of contamination. Lysozyme is another tool for the control of microorganisms previously unavailable to the homebrewer. ■

Jessica Just is a representative of Scott Labs.

Blending

Brew High. Serve Low.

Story by Chris Colby

Quick Dilution Guide
(for 5-gallon (19-L) batches of beer)

Amount expanded (percent)	volume water added (gallons)	total volume (gallons)	extra bottles of beer (12 oz./355 mL)
5%	0.25	5.25	2.67
10%	0.50	5.50	5.33
15%	0.75	5.75	8.00
20%	1.00	6.00	10.67
25%	1.25	6.25	13.33
30%	1.50	6.50	16.00
35%	1.75	6.75	18.67
40%	2.00	7.00	21.33
45%	2.25	7.25	24

One of the greatest thrills in homebrewing is supplying the beer for a special event. You probably won't be brewing for too long before someone asks — or you volunteer — to supply beer for a large gathering. My wife and I are both homebrewers and when we got married we wanted the homebrew to flow freely. At the time, however, we didn't have a lot of time or fermenter space. In order to increase the output of our homebrewery, we turned to high-gravity brewing — brewing a strong beer and diluting it to its target strength when the beer is bottled or kegged. This practice is also called standardization or blending.

High-gravity brewing (or blending) is a technique the big US brewers use. American Pilsners are brewed with an original gravity (OG) around 14–16 °Plato (SG 1.056–1.064). After fermentation, the strong beer is diluted to a virtual OG of around 10–11 °Plato (1.040–1.044). The big breweries brew this way because they can produce more beer with high-gravity brewing than if they brewed it all at working strength. A fermenter that holds 500 barrels of beer will end up producing 700 barrels of beer. For homebrewers, a 5-gallon (19-L) batch of strong beer can easily be diluted to yield 6–6.5 gallons (23–25 L) of finished beer, more if you're careful.

The beer is not "watery"

In order to successfully practice high-gravity brewing, you need to be able to produce a decent strong beer as the base beer. If you can do that, the dilution technique itself is very simple.

Contrary to popular homebrewing wisdom, high-gravity brewing does not produce "watery" or thin-bodied beers. In fact, many craft breweries (New Belgium, for one) use this technique to produce "full-bodied" beers. Simple math can demonstrate why this is.

Let's say you wanted to brew 5 gallons (19 L) of beer in the usual manner at an original gravity of 12 °Plato (SG 1.048). If you use a yeast strain with an attenuation of 75%, it will finish at a final gravity (FG) of 3 °Plato (SG 1.012). Now let's say you wanted to brew the same beer using high-gravity techniques. You brew 5 gallons (19 L) of base beer at 15 °Plato (SG 1.060) and then dilute it to 6.25 gallons (24 L), corresponding to a virtual OG of 12 °Plato (SG 1.048). If you used the same yeast — with the same 75% attenuation figure — your pre-dilution base beer would finish at 3.75 °Plato (SG 1.015). Upon dilution, your diluted FG would be 3 °Plato (SG 1.012) — same as it was with the normally-brewed batch. Because strong beers finish at higher FGs, diluted beers end up at the FG they would have obtained had they been brewed at their virtual OG using normal brewing procedures.

Of course, U.S.-style Pilsners do not exhibit much body. These beers are brewed with 30–40% corn or rice as an adjunct. As a result, there are fewer nonfermentable carbohydrates in them compared with all-malt beers. The rate of adjunct usage, not the blending technique, causes the low body of U.S.-style Pilsners.

Easy recipe calculations

The easiest way to formulate a high-gravity brewing recipe is to take a recipe for one volume and expand it to the larger target volume. However, you should brew the beer at the original volume. To calculate how much to expand the recipe, divide the larger volume of target beer by the smaller volume of strong beer.

For example, let's say you have a 5-gallon (19 L) pale ale recipe with 10 lbs. (4.5 kg) pale malt, 1 lb. (0.45 kg) crystal malt and 2 oz. (56 g) of bittering hops. If you want to end up with 6 gallons (23 L) of beer, multiply all the ingredients by 6 divided by 5, or 1.2. You'd end up with 12 lbs. (5.4 kg) pale malt, 1.2 lbs (0.54 kg) and 2.4 oz (68 g) of hops. Brew 5 gallons (19 L) of this beer and dilute it to 6 gallons (23 L).

A drawback to this simple calculation method is that hop utilization slightly decreases at higher wort gravities. Thus, using proportionally more hops in your high-gravity base beer may lead to an underhopped diluted beer. However, in most cases, this discrepancy will be minimal.

Complete recipe calculations

To completely master high-gravity brewing calculations, all you need to know is one simple formula:

$$C_1V_1 = C_2V_2$$

where C is concentration and V is volume. The subscripts refer to the initial strong beer and resulting blended beer.

For calculating gravity, use "gravity points" — the decimal portion of specific gravity as an integer. For example, a specific gravity of 1.045 equals 45 "gravity points." If you had 5 gallons (19 L) of wort at a specific gravity of 1.064, what would the gravity become if you diluted it to 7 gallons (26 L)? Substituting the values into the equation, we get 64(5) = X(7). Solving for X, we get 64(5)/7 = 45.7, or a specific gravity of almost 1.046. You can also use degrees Plato for these calculations.

You can use IBUs and SRM values as a concentration (C) in these equations for calculating bitterness and color values. For example, if your 5-gallon (19-L) batch of beer had 50 IBUs, the equation 50(5) = X (7) would give you the resulting IBUs in your 7-gallon (26-L) final beer. (It would be 35.7 IBUs.)

Using brewing software, such as ProMash, you can calculate your OG, IBUs and SRM for your strong beer. Then, you can calculate the values for the diluted beer using the "CV" formula. This way, the influence of wort gravity on bitterness will be taken into consideration.

Brewing the base beer

Brew your base beer as you would any strong beer. The quality of your final beer will depend primarily on how well the fermentation of your strong beer went. For general tips on brewing strong beers, see my article "Monster Beers" (December 2003) or Bill Pierce's article "Brewing the Big Ones" (December 2003).

Fermentation byproducts, such as esters and higher alcohols (fusel oils), are produced at a disproportionally greater rate in "thick" worts than in "thin" ones. At higher dilution rates, you may notice that your finished beer is a bit more estery than it would have been had you brewed it normally. If your final beer tastes too estery, has fusel notes or other unwanted fermentation byproducts, you've pushed the technique too far. At higher dilution rates, you may also need to tinker with your recipe a bit to get the beer to taste as you want it.

The big breweries typically do not exceed 16 °Plato (SG 1.064) when brewing their strong beer for dilution. Above this gravity and the resulting blended lager is too estery. For most lagers to be blended, 16 °Plato (SG 1.064) is a reasonable maximum starting gravity for the strong base beer.

When brewing ales, the amount of esters in the beer can be manipulated not only by practicing good fermentation practices but also by picking an appropriate yeast strain. A neutral yeast strain — like Wyeast 1056 or White Labs WLP001 — will ferment cleanly at high gravities and yield acceptable finished beers. I've had good results brewing ales up to 21 °Plato (SG 1.084) and diluting them to 16 °Plato (SG 1.064). The upper gravity limit for ales depends on your own tolerance of the final ester levels in your beer.

Whether brewing a lager or an ale, let your beer ferment completely and condition for an appropriate amount of time. The dilution step occurs when the beer is ready to be bottled or kegged. Whether bottling or kegging your beer, you will prepare your dilution water the same way.

Preparing the dilution water

Your dilution water should taste good and be free of chlorine or chloramines. As when you prepare your brewing liquor, carbon filtering your tap water should yield acceptable dilution water. There is no need to add calcium or other "brewing salts" to your dilution water.

Under most normal circumstances, water has some oxygen dissolved in it. At 68 °F (20 °C), pure water that is exposed to air will have 9.0 parts per million (ppm) oxygen at equilibrium. This amount decreases at higher temperatures.

When you dilute your beer, you don't want to introduce oxygen into it. Oxygen will cause the beer to go stale faster than it normally would, resulting in cardboard-like aromas or sherry-like flavors. So, you need to remove the oxygen from your dilution water.

One way commercial breweries remove oxygen from their water is by heating it and spraying it into a vacuum chamber. The resulting water contains less than 50 parts per billion (ppb) oxygen. Obviously, you probably don't have the specialized equipment for this lying around your home brewery. Fortunately, there's an easier way to deaerate water.

To reduce the oxygen content of your dilution water, boil it vigorously for 15 minutes. I usually measure out the amount of water I need for dilution plus about 5% to account for evaporation. After boiling, cool the water as quickly as possible. Putting your pot in an ice bath works well for this. Be careful not to splash or agitate the water while chilling as you will reintroduce oxygen into the water. Unless you have a way of storing your dilution water under CO_2, you should prepare it immediately prior to use. Immediately after boiling, your water will contain less than 1 ppm oxygen.

If you are paranoid about oxygen, you can also add an antioxidant to the dilution water. A quarter teaspoon of ascorbic acid (vitamin C) added to 5 gallons (19 L) of just-blended beer will do the trick.

For bottle conditioned beers, adding ascorbic is absolutely unnecessary. The active yeast that condition the beer in the bottle should quickly take up any oxygen that might be in the brew. For force carbonated kegs, adding a pinch of yeast is also an option. (Keep in mind that, unless you filtered it, your beer already has a small amount of yeast in suspension.)

If you boil your water, quickly cool it and use it immediately, you shouldn't need to take any additional steps to reduce your beer's oxygen content. I've never used ascorbic acid, or added yeast to my kegged beers, and I've never had a problem with premature staling in my blended homebrews.

Diluting when bottling

If you are bottling your beer, begin by quietly transferring your dilution water to your bottling bucket. Siphon the water or pour very carefully, don't just dump it in. Next, add your bottling sugar then rack your beer on top of the water and sugar. (Note: you can boil your bottling sugar in your dilution water to save a step.) Siphoning the beer into the water should be sufficient to mix it thoroughly. However, it never hurts to stir the beer quietly (slowly and without splashing) to be sure.

Once you've mixed the water and beer, bottle and condition as you normally would.

Many bottling buckets hold over 5 gallons (19 L) of beer, so you will probably be able to handle at least 6 gallons (23 L) of blended beer. If your bottling bucket is not large enough to hold all the diluted beer, you have two options. The first is simply to bottle the batch in two shifts. The second is to bottle some beers as undiluted base beer first, then siphon in the dilution water when there's enough room in the bucket. (To make things easy, use PrimeTabs or Coopers carbonation drops for the bottled strong beer.) If you do this, remember to adjust your dilution calculations accordingly.

Diluting when kegging

If you are kegging your beer, begin by filling the keg with CO_2. To do this, fill the keg with water and push all the water out with CO_2. At this point, you've replaced the water in the keg with CO_2. Next, vent the excess pressure and open the keg lid. Rack the dilution water into the keg followed by the base beer. Finally, replace the keg lid, turn on the CO_2 and force carbonate. (You may want to vent the keg a couple times with the CO_2 on to blow off any oxygen in the headspace.)

If you brew 5-gallon (19-L) batches and keg your beer in the standard 5-gallon (19-L) Cornelius keg, you will always have beer left over if you plan on diluting it. There are a couple possible solutions to this problem. The simplest is to split the beer into two kegs. Another is to force carbonate the keg, then bottle off some of the strong base beer with a counter-pressure bottler. Once you've bottled a volume of beer equal to the planned amount of dilution water, add the water to the keg.

If you frequently dilute high-gravity beers and have a kegging system, there is one "trick" you can use to make the diluting step fast and easy. Prepare an entire keg of de-aerated water by boiling 5 gallons (19 L) of water, cooling it and siphoning it to a keg. Force carbonate the keg so you have 5 gallons (19 L) of carbonated water. When you brew your base beer, keg it and force carbonate. When it comes time to dilute the beer, use a "jumper" to move the (carbonated) water into the (carbonated) beer keg. A "jumper" is just a normal beer line with "beer out" connections on both ends. Connect the "beer out" side of the water keg to the "beer out" side on the receiving beer keg. Release the pressure on the beer keg and open the lid. Push water from the water keg to the strong beer keg though the dip tubes on both kegs. Once the correct level is reached in the receiving keg, disconnect the "beer out" line from the water keg.

There are two advantages to using a carbonated water keg for dilution. Beer diluted this way is ready to serve since both the beer and water are carbonated before you blend them. Secondly, you can always quickly "expand" your existing kegged beer supplies if you need to.

Applications

High gravity brewing can be used for making many styles of beer, although it is most commonly associated with American Pilsners. It works best when you are planning to make a low to moderate-strength beer.

The first time you try this technique, consider using about 10–20% dilution water. Adding dilution water at a volume of less than 10% of your beer's volume — in my opinion — does not yield enough extra beer to be worthwhile.

For a 20% dilution, you could make 5 gallons (19 L) of beer at a specific gravity of 1.058 (14.4 °Plato) and dilute it to 6 gallons (23 L) of beer at 1.048 (12 °Plato). If you bottle, this will result in almost 11 more 12 oz. (355 mL) bottles than a standard 5-gallon (19-L) batch. (See the chart on page 47 for the amount of water to add for various dilution rates.)

For beers diluted at a 10–20% rate, you should be able to simply scale up any beer recipe and brew it slightly stronger. The diluted beer should not taste noticeably different from the same beer brewed in the normal way.

If you try high gravity brewing and like it, you can try adding more dilution water to yield more finished beer. It's not too hard to brew a good beer with 30% dilution water. And, if you really want to push it, you could try going to 40%. At 40%, you'd end up with 7 gallons (26 L) of beer from your 5-gallon (19-L) base batch. The biggest drawback to keep an eye out for is unacceptably high ester levels in your finished beer.

The second problem to watch out for in high-gravity brewed beers is early staling. With increasing amounts of dilution water, you are introducing more oxygen into your beer. I wouldn't recommend large dilutions if you are planning to store your beer for long periods (over, say, 6 months). Conversely, if you are diluting fresh beer for a big party in which you expect all the beer to be consumed, you can attempt to maximize your amount of beer as it takes awhile for staling products to develop. Use some sense when diluting, however. Always remember that 6 gallons (23 L) of good homebrew is better than 7 gallons (26 L) of undrinkable swill.

I brew most of my beers the normal way. However, I'll use high gravity brewing when I'm low on beer or if I want to make two beers — a strong one and a regular one — from the same batch. Don't let the fact that this technique is mostly used to produce "fizzy yellow water" dissuade you from adding this useful technique to your set of brewing skills. ■

Chris Colby, editor of BYO, prefers more beer to less beer.

Tap Handles

Give your kegs some character

story and photos by Thom Cannell

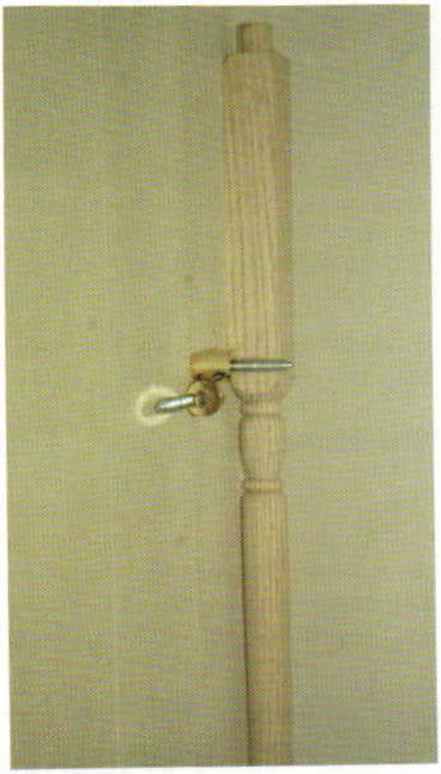
Every few issues we get a request for something easy enough to build on a Saturday afternoon. Tap handles are just such a project and I built one in less time than it took for the University of Michigan football team to defeat my hometown Michigan State Spartans.

Why would you make your own tap handle when there are so many available? Because tap handles actually belong to the brewery (unless legitimately purchased) and because having your own tap handle, unique in every way, is totally cool.

Tap handles can be incredibly complex or blindingly simple. I researched tap handles at my local homebrew store, where a collection of 100 tap handles greets patrons of The Red Salamander. All had several things in common, whether made of wood, cast in acrylic, or some odd combination of the two. All were more than 6 inches (15 cm) long; all had a tapered ferule and all had the ferule attached via a "hanger" bolt.

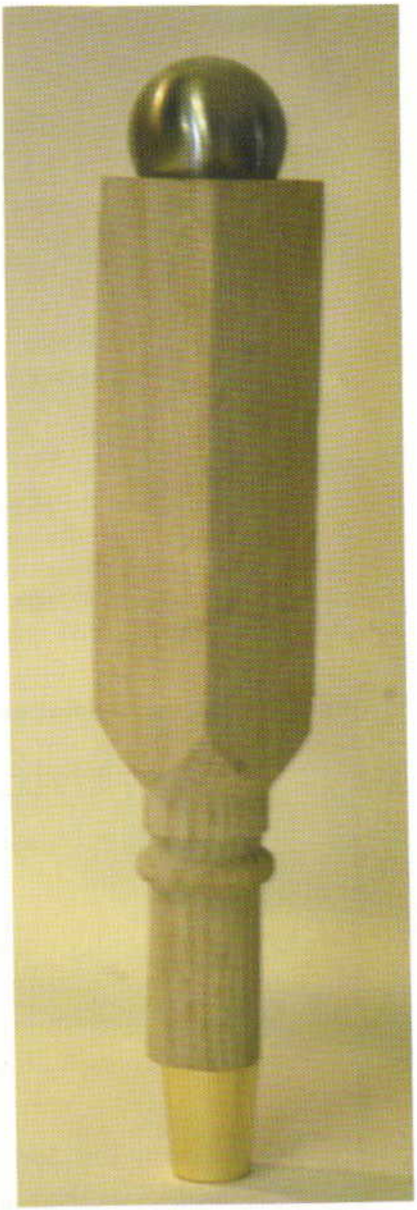
At its most basic, a tap handle is a wooden stick with two pieces of hardware. Sticks I know about. But where to get the hardware? MoreBeer.com offers both hanger bolts (easy to find and cheap at under $1) and more difficult to find ferules. Ferules are $3.25, exclusive of shipping.

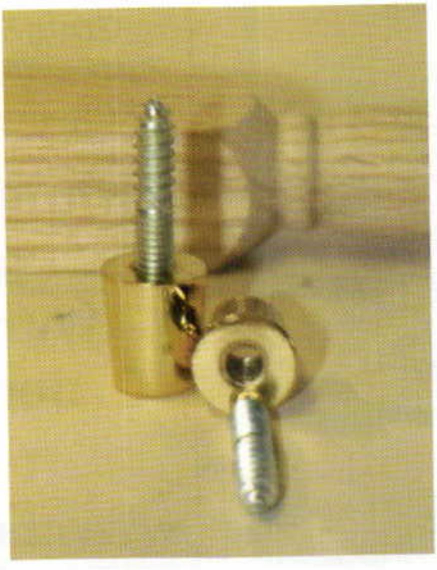
Now for the stick. The long stick is simply a wooden spindle meant for constructing new stairs. It suits our purposes precisely. While making logs into sticks is a very fun task involving saws, lathes, chisels and everything in the woodworking toy chest, it is best left to woodworking hobbyists. Most home stores stock rails and spindles, so why do the work? You are trying to get in and out of this project in an afternoon aren't you? I bought a single oak spindle for a few bucks (USD). It was roughly 2 inches square (50 mm) and had a long spindle and multiple turnings



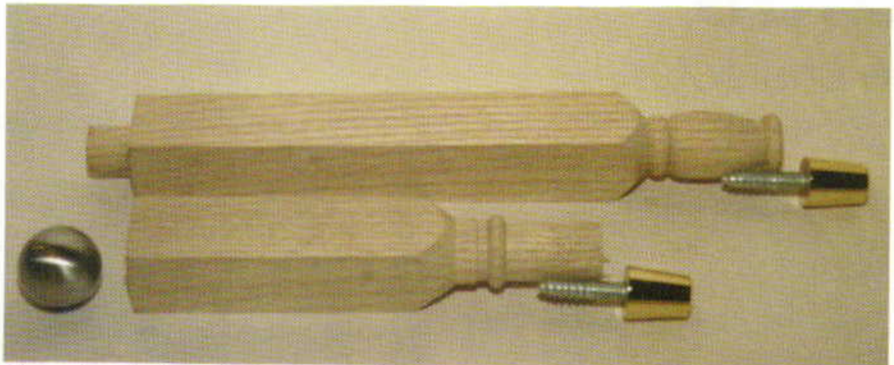
(Top) The long stick is the type of wooden spindle meant for constructing banisters. As fun as staircases are, you'll enjoy making tap handles even more.

(Right) The wooden tap handle shown here is the perfect Saturday afternoon project for the homebrewer without a lot of time on his hands.





(Left) A close up of the ferule and hanger bolts.



Shown here is the spindle cut into two tap handles and the ornamental finial placed in position. The ferule and hanger bolts are loosely assembled and will be fit into the thin edge of the spindle. Add sand paper and paint or varnish to complete the supply list.

near each end. So for about $12 I had enough materials for two tap handles!

What to buy

The following is a list of supplies that you will need to purchase for this project: one spindle, one or two ferules, one or two hanger bolts. You'll also need a drill, sand paper, a decorative object or two and some paint or varnish to finish the wood.

Step by Step

One: Decide on the length of your tap handle, choosing a separating point near one of the turnings. Cut there, and remove some of the square length (assuming you have extra) to create your ideal length. For this project, I wanted a decorative finial to adorn the top of my tap handle. You may prefer a wooden plaque holding your own custom label like Redhook places atop their distinctive yellow handles.

Two: Sand the wood lightly. Oak, the wood I chose, is open grained and should be sealed. Any imperfections should be sanded out or filled and sanded. If you will be painting your tap handle, multiple coats are required to recreate shining, glossy tap handles. Sand lightly between coats. If you appreciate wood like I do, choose a stain and a clear finish and follow the manufacturers' directions. Other options for decoration include wood burning, application of custom labels under clear finish (decoupage) or applying metallic objects. I chose a mushroom-shaped drawer pull.

Three: Insert the hanger bolt. Hanger bolts have a wood screw on one end and a typical bolt on the other. Find the absolute center of your tap handle's end and mark it, then use a sharp prick punch to start a pilot hole. Drill a pilot hole, 1/8 of an inch in my case, then enlarge it to fit the hanger bolt. In the U.S. hanger bolts suited to tap handles are 5/16-inch by two inches. I do not know what the metric world has to offer — sorry. Your final hole should be 1/4-inch, or you will, as I did, split the wood. Drilling a 1/4-inch pilot hole for a 5/16-inch screw leaves just the threads cutting into the wood. Another tactic for preventing splitting is to wrap the end with several turns of wire while inserting the wood screw.

As there is no slot for your screwdriver, use a technique called double nutting to turn the screw. Run one 5/16-inch nut onto the shaft of the screw, then another, and tighten the two together, then use the nuts to drive in the screw. Remove the nuts and screw on the ferule.

Four: Adding a finial to enhance the handle is equally as easy. The procedure is similar. The drawer pull I chose, and most drawer pulls, have a shaft on them. If there wasn't you couldn't get your fingers underneath.

Drawer pulls come with their own hardware. This will enable you to discover the size of the mounting bolt. Mine was 8-32. Hanger bolts are available in 8-32 size and many lengths. A one inch (25 mm) length might be a bit short.

Five: I wanted the mushroom end to mate flat to the top of the tap handle. This required sinking the shaft of the pull below the top. Again, predrill a 1/8-inch pilot hole, perfectly centered, into the top. For this size hanger bolt

Sanding the wooden tap handle makes for a smooth finish. Sand lightly between coats of paint or varnish. You can clamp the tap handles in your vice, but be sure to use pieces of scrap wood to prevent marring the finish.

(Left) You must center the pilot and final holes precisely and use the correct drill size or the thin wood will surely crack. Double nutting permits driving the hanger bolt into the the predrilled shaft hole.
(Right) This is *not* the project you will be completing in an afternoon, rather a taste of what our future tap handle project has to offer. Stay tuned!

you'll need a 5/32-inch final hole. Drill a larger hole to conceal the shaft of your drawer pull; mine was 5/8-inch in diameter and 1/2-inch deep.

When inserting the hanger bolt into the finial (drawer pull), I'd suggest using some kind of liquid thread locker like Loctite to keep the hanger bolt secure — you might want to remove the drawer pull later. A liberal application of nail polish can also do the trick.

Six: With all the mechanical preparation complete, it's time to complete the finish. Be sure your surfaces are sanded smooth and apply your sealant. Sand again and reapply sealant or stain (according to directions) and then the final finish. Please, send us photos of your completed tap handles and if we compile enough, we will run a special showing in a future issue!

Thom Cannell writes Projects in every issue of BYO. He also enjoys writing about cars for a living. ■

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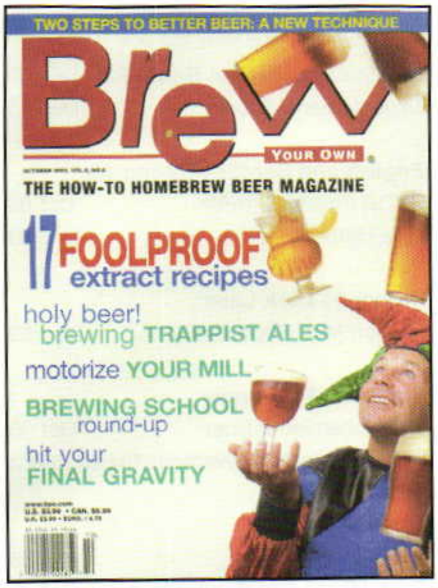

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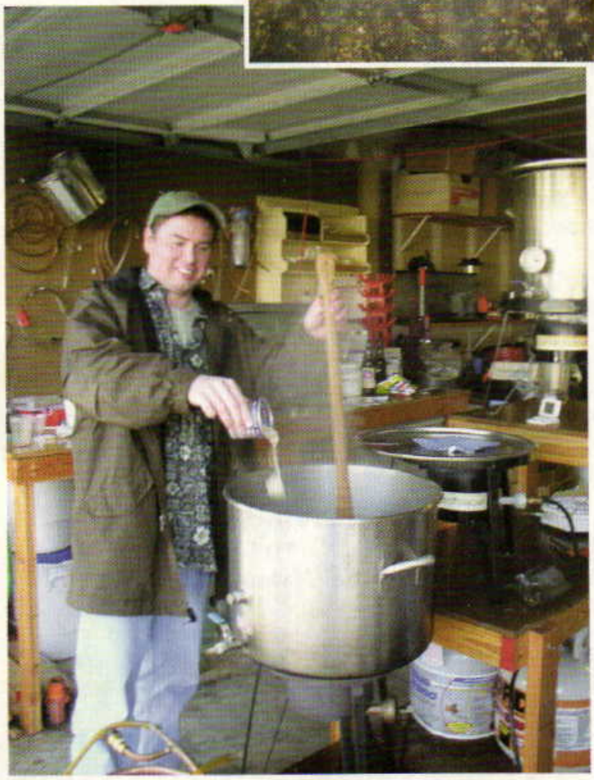
HOMEBREW directory

Oyster Stout

A seaworthy stout experiment

by Joe Walton

PHOTOS COURTESY OF JOE WALTON



Here's Jim adding oysters to a perfectly good stout (and a close up of the oysters in the wort). By the end of the boil, only two oysters of the 24 oysters could be identified. Although the idea was "fishy," the beer wasn't.

MY FRIEND JIM Michalk is the kind of homebrewer you love to hate. He thinks of an extreme or strange beer to brew, comes over to your house to brew it and somehow makes you do all the work. Then, when the beer comes out wonderful, he gets all the credit for it.

This summer Jim wanted to brew an oyster stout. What would possess someone to throw a bunch of oysters into a perfectly good stout? I'm not sure, but Jim felt that he had to. We researched oyster stout, but there is not a lot of information out there. One brewery used the crushed shells as finings and another used the juice from oysters. Some made oyster stouts without any oyster. We brought the subject up at our monthly homebrew meeting and the only usable information we received was that Jim was insane. After the meeting, we stopped by a grocery store. Jim has a philosophy that if an ounce or two is good, a pound is better. This idea extended to oysters and we bought a large jar of 24 raw oysters in brine.

The next day was a drizzly cold day in Austin, Texas. What better day to brew a beer from the sea that should not exist? With fifteen minutes left in the boil, Jim added the oysters — brine and all. However, after we ran the wort through the chiller, there were only two oysters left in the pot. We ate them (they were terrible), but where did the others go? We didn't see any oysters in the fermenter. However, after three days, little grey fatty nodes appeared in the kraeusen.

The finished product was tasty. It did have a slight briny taste to it, but was actually one of the smoothest stouts I have ever had. If we did not tell people that there were oysters in it, they would not have noticed. Jim wants to brew The Black Pearl again . . . this time with more oysters.

Black Pearl Oyster Stout

(5 gallons/19 L, all-grain with bivalve mollusks)

OG = 1.052 FG = 1.013
IBU = 37 SRM = 60 ABV = 5.0%

Ingredients

9.0 lbs. (4.1 kg) 2-row pale malt
0.5 lb. (0.22 kg) flaked oats
1.0 lb. (0.45 kg) roasted barley
0.5 lb. (0.22 kg) chocolate malt
0.25 lb. (0.11 kg) black patent malt
10 oz. (283 g) raw oysters and brine
1 tsp. Irish moss (15 mins)
8.6 AAU Fuggles hops (60 mins)
(1.5 oz./43 g of 5.7% alpha acids)
4.3 AAU Fuggles hops (20 mins)
(0.75 oz./21 g of 5.7% alpha acids)
Wyeast 1084 (Irish Ale) yeast

Step by Step

Mash grains for 45 minutes at 152 °F (67 °C). Boil wort for 120 minutes. ■