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THE HOW-TO HOMEBREW BEER M

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January 1999, Vol.5, No.1
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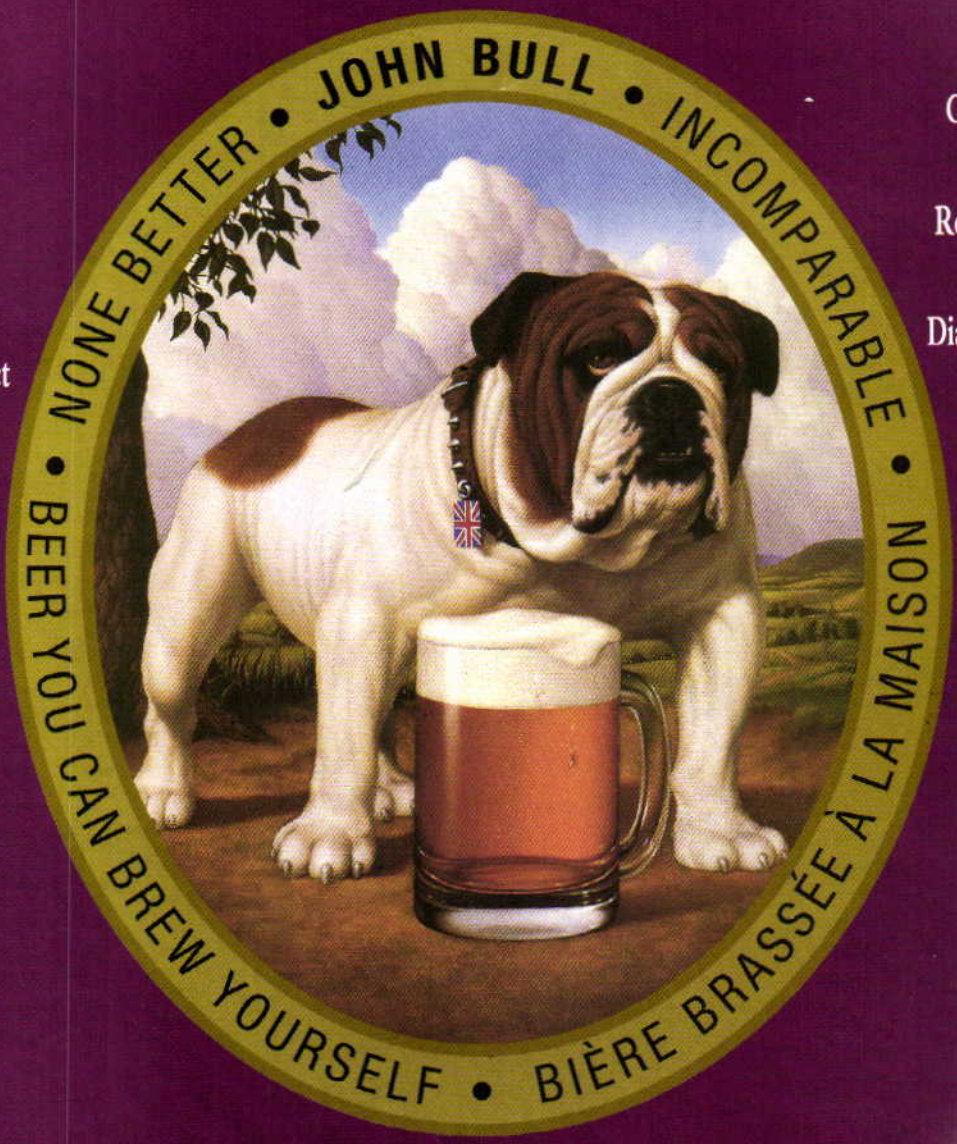

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Cover photo: Kent Lacin
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We're Back in Style

When I was a kid there was a show on television called "Space 1999." I don't remember it very well, but the general premise was people zooming around the galaxy in space ships roughly the size of Montana.

Now here it is 1999, and believe me, it's an odd feeling to arrive in a year that you once considered to be so far in the future that you would be flying from planet to planet. Especially when the reality seems more like Back to the Future: John Glenn gets to go up — *again* — and I'm still planted on the terra firma. Not only that, but he didn't actually travel anywhere. He went up, did a few hundred loop-de-loops, and came back down. What's the fun in that?

First 1984 arrives and no Big Brother, now 1999 and no planet hopping. I've got a pretty strong feeling there won't be any space odyssey in 2001, either. A book, a TV show, and a movie, all wrong. Next they'll say that Oliver Stone didn't kill JFK.

For those of us rooted in the here and now, BYO has a new feature to take our minds off the fact that the closest thing we have to interplanetary travel is still a trip to West L.A. Actually, like John Glenn this feature is more back to the future than future. This month we relaunch Style of the Month.

Beginning with the first issue of BYO, Style was one of our most popular columns. We were lucky to have two very talented writers, Jeff Frane and Alex Fodor. But when each in turn had to give it up, we decided to let it rest for awhile rather than produce something we weren't proud of. We were immediately deluged with letters, e-mails, and even a few phone calls suggesting that we bring the column back as fast as possible. Six months later, it's back.

The new Style is bigger and, we think, better. Actually, it's an annual brewing calendar. Each installment will feature two different beer styles and both extract and all-grain recipes for each. In addition, there's a monthly calendar that does the planning for you: when to start your yeast, when to brew, when to transfer, when to bottle. The calendar will be continuous, so in the March installment, for instance, we'll list the date when you should bottle the barleywine you brewed in January.

Set your brewing schedule by the Style of the Month calendar and by the end of the year you'll have 24 beers, 24 different styles. We've thought about seasonal beers, holidays, and making sure that you always have a beer ready to drink.

Styles include: February steam beer, Dublin stout; March dunkelweizen, ESB; April maibock, Belgian golden; May amber ale, pale ale; June pilsner, nut brown ale; July IPA, Belgian trippel; August witbier, kolsch; September, Oktoberfest, hefe-weizen; October dopplebock, Scottish ale; November porter, frambozenbier; December Christmas ale, old ale.

You know that new pocket organizer, desk calendar, filing cabinet that you bought to finally put things in order? That's great for the office, but when it comes to brewing, we're doing the work for you.

So get yourself back in Style. It begins on page 15.

Craig Bystrynski

Brew Your Own
The How-To Homebrew Beer Magazine

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Clone Search

Dear Brew Your Own,

I haven't noticed a clone of Samuel Smith Winter Welcome in any of your cloned beer articles. Any ideas on creating one?

Mark Jacob
via e-mail

St. Patrick's of Texas Brewer's Supply offers the following recipe for its St. Nick's Winter Warmer.

St. Nick's Winter Warmer

(5 gallons, extract with specialty grains)

Ingredients:

- *1 lb. crystal malt, 40° Lovibond*
- *10 lbs. Briess pale malt syrup*
- *1.5 lbs. corn sugar*
- *2 oz. Challenger hops (8.2% alpha acid) for 60 min.*
- *1 oz. Golding hops (5.1% alpha acid) for 5 min.*
- *Scottish ale yeast (Wyeast 1728; White Labs Edinburgh Ale, WLP028)*
- *1 cup corn sugar for priming*

Step by Step:

Steep crystal in 3 gal. water, raising heat gradually to 179° F. Remove grains and add extract and 1.5 lbs. corn sugar. Bring to a boil. Total boil is 60 min. Add Challenger hops and boil for 55 min. Add Golding hops and boil 5 min. more. Cool wort, transfer to fermenter, and pitch yeast at 75° F.

Ferment for one week at 55° to 70° F. Prime, bottle, and age one to two weeks.

OG = 1.079

Dear BYO,

A reader asked about Bitburger Pils in Mail (October '98), and BYO asked the readers for help. You should have asked your editor because he endorsed the new book "Clone Brews." It's a good book with a recipe for Bitburger, among others. How about a recipe for Altenmuenster Malt Liquor? And for my tasteless friend, does anyone have a recipe for Old Milwaukee? If I can make a better version and get him to try other homebrews, maybe I can redeem his Beer Soul.

Bill Peters
via e-mail

Bitburger Premium Pils

(5 gallons, extract with specialty grain)

This light- to medium-bodied pilsner makes a lively entrace with a big, well-balanced malt and hop nose.

Ingredients:

- *4 oz. German light crystal malt, 2.5° Lovibond*
- *4 oz. German Munich malt*
- *6.6 lbs. Ireks light malt syrup*
- *1 oz. German Northern Brewer hops (8.5% alpha acid) for 60 min. (8.5 AAU)*
- *0.5 oz. Perle hops (7% alpha acid) for 15 min.*
- *0.25 oz. Hallertauer Mittelfrüh (4.5% alpha acid) for 10 min.*
- *0.25 oz. Tettnanger (4% alpha acid) for 5 min.*
- *Wyeast 2278 (Czech Pilsner lager) or Wyeast 2007 (Pilsen lager)*
- *1 tsp. Irish moss*
- *3/4 cup corn sugar for priming*

Step by Step:

Crush and steep grains in 0.5 gal. 150° F water for 20 min. Strain grain water into brewpot. Sparge with 0.5 gal. water at 150° F.

Add water to the brewpot for 1.5 gal. total volume. Bring to a boil. Total boil will be 60 min. Remove from heat and add extract and Northern Brewer hops. Add water until total volume is 2.5 gal. Boil 45 min. and add Perle hops and Irish moss. Boil 5 min. more and add Hallertauer hops. Boil 5 min. more and add Tettnanger hops. Boil 5 min. more. Cool for 15 min. Strain cooled wort into primary fermenter and top up to 5 gal. At 80° F pitch yeast.

Ferment in primary five to seven days or until fermentation slows. Rack to secondary, prime, and bottle when fermentation is complete.

OG = 1.048 to 1.050
FG = 1.010 to 1.013

MaiL

36 IBUs

For all-grain and mini-mash methods, refer to Clone Brews *by Tess and Mark Szamatulski, Storey Books, Pownal, Vt. It is available at homebrew shops and bookstores. This recipe is reprinted with permission.*

Hazelnut Essence

Dear BYO,

Recipe Exchange (October '98) includes a recipe for a hazelnut brown ale. I have been unable to find the Noirot hazelnut essence called for in the recipe. I would appreciate any suggestions you can offer on where to find this ingredient.

Tim Harrington
Medford, Ore.

Noirot hazelnut extract is available at most homebrew supply stores. If your retailer doesn't carry it, ask him to check with his homebrew supplies distributor.

Making Cider

Dear BYO,

I found gallons of apple cider at the local supermarket for $1.99 and excitedly thought, wow, let's make hard cider. The cider contains potassium sorbate. Will this kill the yeast and prevent it from fermenting?

Ed Barns
Walnut Creek, Calif.

Potassium sorbate, potassium metabisulfite, and sodium benzoate are common additives used to prevent yeast from growing in sweet beverages such as apple juice, sodas, and sweetened iced teas.

These additives will prevent the growth of yeast if too much is used, and the commercial apple juice probably contains enough to prevent yeast growth. However, these additives can be used in low dosages to kill the incoming wild yeast without having adverse affects on added yeast (because a lot is added). This is how winemakers use potassium metabisulfite to treat their must prior to fermentation. For homemade cider the best bet is to buy juice without any preservatives.

Quint Floyd
College Station, Texas

After a terribly hot and dry summer we here at our homebrewery, Crossroads Brewing in College Station, Texas, have made it back into the brewing season. Seems like the rest of the world looks forward to summer for making beer, but with the system we are using it just doesn't work. Our last brewday before the summer slammed into us with record highs and little to no rain took place in mid-May.

We had a turnout of about 14 people for the feast after the brew work. They arrived to see three very drained, tired, dehydrated men. Fortunately for them, I had already cooked the food and tapped two kegs of homebrew. They listened in sympathy as we tried to convey what had gone on in the brewery.

We fired up the hot liquor tank to create the mash water at 10 a.m. Things seemed a bit warmer but hey, summer's coming, right? When we started the boiling pot and fired up the burner for the sparge water, the temperature in my garage reached 134° F. Suddenly this little hobby of ours wasn't so much fun anymore! The humidity was so high my glasses were smeared.

We got the boil to where there was no threat of a boilover and retreated to the house to cool off. You could feel the warmth through the door from the garage into the house!

Everything turned out okay in the end. But we vowed not to brew anymore until cooler weather came. We ran out of our homebrew rather early in the summer because our season was cut so short. Someone suggested brewing smaller batches in the house but even that left primary fermentation temperatures at damn near 80° F. So we waited.

October 18th was to mark our return! We felt sure by then we could make beer in ideal temperatures and weather. In anticipation I bought a conical fermentation tank. I also had a secret for the gang. I had hidden our last quarter barrel of strong ale in cold storage all summer for this special day. So as the troops began to file in, giddy at the start of our favorite pastime, a mug of the past made it even better.

We had talked about calling this brew Heat-stroke Strong Ale back on that fateful day in May. But in an ironic twist of fate, this was the weekend that Texas was hit by huge areas of flooding and unseasonably cold weather! We named it Thunderstorm Strong Ale.

Frances Besne
Orangvale, Calif.

It was Frances Besne's son Gene (shown here holding the molecular structure of alcohol) who got her started as a homebrewer while he was a chemistry student at University of California, Davis. Gene's dog Alegra and Frances' greyhound Lotus have proven loyal brewing companions.

Eye of the Brew Storm

What are the most unusual conditions — weather or otherwise — in which you've brewed? There's a cool BYO T-shirt in it for you. Send your story to Pot Shots, c/o Brew Your Own, 216 F Street, Suite 160, Davis, CA 95616. Or send us e-mail at edit@byo.com. Be sure to include your mailing address!

A Fondness for Stout

I have been homebrewing for almost two years now. With the exception of the first two failed batches, my faithful brew partner has been my dog, Tasha. Tasha is a German shepherd and husky mix who tries to be involved with every step of the process. She examines everything, paying special attention to the hops.

Her enthusiasm begins to rise as soon as I start pulling out the equipment. After much discussion I have convinced her to stay out of the way during the boiling and bottling. She seems to particularly enjoy the aroma of the wort as it boils.

Her favorite, however, is when bottling time arrives. I'm known for being somewhat messy, but my dog appreciates me for it. While I cap bottles, she is busy cleaning up my slops and overfills. She seems to have a real fondness for stouts.

— Randy Hodges
Lincoln, Neb.

Sleeping Dogs Lie

Until she reached about nine months old, my brown dog Charcoal was named Tammy. That was when she knocked over the (cold) barbecue grill and rolled merrily around in the spent charcoal and charcoal dust. Then she came inside and rolled around on the (formerly white) carpet. We might never have pinned it on her if it hadn't been for the tell-tale black streaks on the dog door (I'm sure she'd still like to blame our two-year-old).

The first time I brewed with Charcoal (nee Tammy), I made sure to never let her near my propane burner setup. And needless to say, I never left it unattended. She showed a little curiosity at first, but eventually she disappeared through her dog door and into the house. Usually she goes in and out about 2,000 times a day (on average), so I wasn't surprised when she left.

At the time I was steeping grains. Then I began the boil, and she didn't return. She wasn't back by the time I put in the flavoring hops. By the time I was almost ready for the aroma hop addition, I was the one who was curious. It was very unlike her not to check things out when something new was going on. I went inside to look for her.

I didn't find Charcoal in the kitchen, but there were signs of trouble. The wastebasket was on its side, and a few choice items were spread around the kitchen floor. Eventually I found her in a closet in a back bedroom, asleep. Next to her were two empty (and now well cleaned, inside and out) cans of malt extract that I had used for the brew. She had her paw wrapped around the third one and leaned her head on it as she slept.

I'm tempted, but I think it's too late to change her name again.

Tom Frankel
Springfield, Ohio

The Ghost of a Christmas Present

by Scott R. Russell

This month's column is being written by a spirit or perhaps more properly, in a spirit. A spirit of giving, a spirit of generosity. It happens, every once in a while, that I feel my life getting too crowded, too intense, too competitive. I've learned over the years to step back, count my blessings, and concentrate on appreciating the good things in life, one of which is, of course, beer.

The last few months have been among those times: new livestock on the farm, a few additional job-related assignments, interior renovations around the house, and my children are about to become teenagers! We've weeded out the piles of junk in the cellar and the barn, sold some of it, recycled some of it, thrown away a lot — but it still looks cluttered.

So for me, it's time to step back and appreciate an old treasure. This is a glimpse into the traditions of the past, a view of the wonders of the present, and a promise for the future. Hold onto my sleeve and don't be afraid of what you may see or hear.

In olden days (whenever they were) brewers gave their loyal customers a seasonal gift to thank them for a year's patronage. They would brew a special seasonal beer, usually darker and richer, stronger and more flavorful than the year-round ordinary fare. It would be first served on a certain day, often by invitation only, to selected "regular" customers, family and close friends, and just for a very limited time.

It was meant to be a thank you, but also a renewal of the bond for the coming months. The actual style of the beer was different from

Christmas Present Olde Ale
(5 gallons, partial mash)

Ingredients:

- 4 lbs. pale malt
- 1 lb. medium crystal malt (40° to 50° Lovibond)
- 0.25 lb. chocolate malt
- 0.5 lb. malted wheat
- 10 oz. black treacle
- 3 lbs. unhopped amber dry malt extract
- 1.5 oz. Kent Goldings hops (4% alpha acid) for 60 min. (6 AAUs)
- 1 oz. Fuggle hops (4% alpha acid) for 60 min. (4 AAUs)
- 1 quart slurry of English Ale yeast (Wyeast 1098 or other)
- 2/3 cup brown sugar for priming
- 1 tsp. gypsum
- 1 tsp. calcium carbonate

Step by Step:

Crack the grains. Treat 2 gal. water with one teaspoon each of gypsum and calcium carbonate. Heat to 164° F. Add grains, gently mix in. Mash should settle at 152° F or so. Hold for 75 min. Run off and sparge with 4 gal. water at 168° F.

Collect all runnings (hopefully 5 gal.), add treacle and dry malt extract, and bring to a boil. Total boil is 90 min. Boil 30 min., then add both the Goldings and the Fuggle hops. Boil 60 min. more. Remove from heat, chill, and add to primary fermenter with enough chilled pre-boiled water to make 5.25 gal. When cooled to 70° F, pitch yeast.

Ferment warm (68° F) for three or four days, then move to a cooler place (60° F) for a week to 10 days. Rack to secondary and age cool (55° F) for three to four weeks. Prime with brown sugar, bottle, and age for months!

This beer will be drinkable in three months but will be better in six. You may find (if it lasts) that a two-year-old bottle will be wonderful.

OG=1065, FG=1020
(5.8 percent ABV)
40 IBUs

Alternatives:

All extract version: Omit the pale malt. Start by steeping the crystal, chocolate, and wheat malt in 2 gal. of water, gradually raising the temperature to 170° F. Remove the grains and add the treacle and 6 lbs. (instead of 3) dry malt extract. Hop and boil as above. It will be good, but not quite as rich as the partial-mash.

All-grain: Increase the pale malt to 10 lbs., mash with crystal, chocolate, and wheat in 3.5 gal. of water; sparge with 5 gal. Collect 6.5 or 7 gal. of wort, then boil long enough to reduce to 5.25 gallons with hop schedule as above.

Treacle: Treacle is, of course, a variant of molasses. Many homebrew shops now carry it regularly. If yours doesn't, ask them to. Otherwise, in a pinch you might get away with dark (unsulphured) molasses, but use a couple ounces more as it is not as rich as the treacle.

place to place: a barleywine, maybe, or a rich bock, or a strong Scotch ale, but always something special. In our time this tradition has come back, to a certain extent, with winter warmers, spiced holiday beers, and Christmas ales being produced by micro- and craft brewers across the United States. Most of them are quite nice, drinkable, and worth seeking out. But they usually lack the personal touch of a locally made, locally served brew.

The personal touch is the homebrewer's advantage, and I know dozens of brewers who really make an elaborate production at holiday time. They make special labels or buy special bottles, even, for a once-a-year treat, a carefully crafted token of esteem, a present for those around them who appreciate the finer things in life. I can't send all my readers a bottle of holiday cheer, much as I'd like to, but I can give you my recipe for Christmas Present Olde Ale. Make it now for the holiday season 1999. Start a new tradition.

This ale is (loosely) based on a recipe I got from a friend for a barleywine. I decided I didn't like it as a barleywine, so I toned it down to "merely" a strong ale. The malt is underlined by the treacle, and the high hopping rate cuts the sweetness nicely. It does finish a bit on the high end, gravity-wise, so it ends up rich and filling. It needs six months in the bottle to mature and mellow.

Reader Recipes

Pete's Wicked Clone

(5 gallons, all-grain)

I first started making this recipe because at the time Pete's Wicked was hard to get where I lived in northern New Hampshire. I could never get the light color with malt extract, so I decided to go all-grain. This was my first all-grain beer.

Brian Newton
Groveton, N.H.

Ingredients:

- 10 lbs. two-row pale Harrington malt
- 4 oz. Cascade hop pellets (5% alpha acid): 2 oz. for 60 min., 1 oz. for 15 min., 1 oz. for dry hopping
- 2 tsp. gypsum
- 1 tsp. Irish moss
- 16 oz. starter of Wyeast 1056 (American ale)
- 3/4 cup corn sugar for priming

Step by Step:

Heat 2.5 gal. water to 175° F. Add gypsum and grain for a mash temperature of 154° F. Hold for 90 min. Sparge with 5 gal. of 170° F water to collect 6 gal. of wort.

Total boil is 75 min. Boil 15 min. and add 2 oz. Cascade. Boil 45 min more. Add 1 oz. of Cascade and 1 tsp. Irish moss. Boil 15 min. more. Turn off heat. Cool wort and pitch yeast at 69° F.

Ferment in primary for six days at 64° to 70° F. Rack to secondary. Add 1 oz. of Cascade. Leave in secondary about 10 days, bottle, and keg as usual.

OG = 1.060
45 IBUs

Graham's Wheat Beer
(5 gallons, extract)

I wanted an easy beer to brew for my main summertime beer. Because my favorite hops are Saaz, naturally I would brew a beer using only Saaz hops. I keep fruit flavor extracts in my refrigerator, and when I want a certain flavor, I just add a small amount to the bottom of my glass.

Jennifer Graham
E-Z Brew Homebrew Supply Shop
Lewiston, Idaho

Ingredients:
- 6.6 lbs. Ireks Weizenbier unhopped malt extract syrup
- 2.75 oz. Saaz hop pellets (3.1% alpha acid): 1.75 oz. for 60 min., 0.5 oz. for 15 min., 0.5 oz. for 2 min.
- 1/4 tsp. Irish moss
- Weihenstephan wheat liquid yeast (Wyeast 3068) starter
- 3/4 cup corn sugar for priming

Step by Step:

Pop yeast pack three days before brewing and culture to make about 1/2 to 1 cup of slurry.

Dissolve malt extract in 3 gal. of water and bring to a boil. Total boil is 70 min. Boil 10 min. and add 1.75 oz. hops. Boil 15 min., add Irish moss, and boil 30 min. more. Add 0.5 oz. hops and boil 15 min. more. In last 2 min. add remaining hops. Cool to 69° F and pitch yeast.

Ferment at 68° to 70° F until complete. Prime and bottle.

OG=1.048
25 IBUs

2nd Street Belgian-Style Special Abbey beer
(5 gallons, partial mash)

This is a fantastic deviation from the norm for anybody looking for a change of pace. It's a light to amber abbey ale fairly true to style with a warming character and residual sweetness. This yeast culture improves with the second and third generation of use. Yahoo.

Gabriel Peabbles
Tucson, Ariz.

Ingredients:
- 2 lbs. Harrington two-row pale malt
- 1 lb. Munich malt
- 0.5 lb. Belgian aromatic
- 0.5 lb. crystal malt, 10° Lovibond
- 1 lb. clear Belgian candi sugar
- 3 lbs. light dry malt extract
- 0.5 oz. coriander seed, crushed
- 1 oz. Hallertauer hop pellets (3.8% alpha acid): 0.5 oz. for 60 min., 0.5 oz. for 15 min.
- Wyeast 1762 (Belgian abbey ale yeast)
- 1/2 tsp. Irish moss
- 2/3 cup corn sugar for priming

Step by Step:

Make a two- or three-step yeast culture prior to brewing.

Mash grains at 155° F for 60 min. Sparge with 170° F water, collecting sweet wort.

Add extract and candi sugar and bring to a boil. Total boil is 60 min. Add 0.5 oz hops. Boil 45 min. Add remaining hops and 1/2 tsp. Irish moss and boil for 13 min. Add coriander seeds and boil 2 min. more. Turn off heat, cover, and steep 5 min. Chill wort, aerate and pitch yeast at 70° to 75° F.

Ferment between 65° to 75° F about one week in primary. Transfer to secondary. When clear, prime with corn sugar and bottle.

OG = 1.061
10 IBUs

Brewmutt's Pale ale (Sierra Nevada Pale Ale clone)
(5 gallons, extract)

If you like Sierra Nevada Pale Ale, you're going to love this one. We've been tweaking it and it is just about impossible to tell them apart in taste and color. And it's simple to make!

Mr. Steve's Homebrew Supply
Manchester, Pa.

Ingredients:
- 3.3 lbs. Muntons extra light unhopped malt extract
- 3.3 lbs. Muntons light unhopped malt extract
- 0.5 lb. crystal malt, 40° Lovibond
- 2 oz. Centennial hop leaves (10.5% alpha acid): 1 oz. for 60 min., 0.5 oz. for 15 min., 0.5 oz. for 5 min.
- Wyeast 1056 (American ale yeast)
- 1 tsp. Irish moss
- 3/4 cup corn sugar for priming

Step by Step:

Steep crystal malt (in muslin bag) in 5 gal. water while bringing to a boil. Before full boil is reached, remove grain. Add extract and return to boil. Total boil is 60 min. Add 1 oz. Centennial hops. Boil 45 min. and add 0.5 oz. Centennial and Irish moss. Boil for 10 min. more and add remaining hops. Boil 5 min. more. When cool to 72° F, pitch yeast.

Ferment in primary one week between 60° and 72° F. Transfer to secondary. When clear, prime, and bottle.

OG = 1.052
52 IBUs

Rusty Neall's New Year Wheat Stout
(Extract with specialty grains)

Here is a recipe that I formulated last year using stuff I had left over. After 11 months in the bottle, it tastes better than ever. It is a little harsh at first, but it mellows with age. I drank a bottle last night and it was great! The head was fantastic and it had a nice, subtle cinnamon nose.

Tim Neall
Oxford, Ohio

Ingredients:
- 3.3 lbs. Muntons wheat extract
- 3 lbs. amber dry malt extract
- 8 oz. roasted barley
- 8 oz. black patent malt
- 5 oz. crystal malt, 20° Lovibond
- 1 oz. Fuggle hop pellets (4.2% alpha acid): 0.5 oz. for 60 min., 0.5 oz. for 30 min.
- 0.5 oz. Golding hop pellets, (5.4% alpha acid) for 15 min.
- 3 cinnamon sticks
- 3 Tbsp. cocoa
- 2 tsp. gypsum

- 1/2 tsp. Irish moss
- Dry yeast

Step by Step:

Crack specialty grains and steep in 6 gal. of water. Remove when water temperature reaches 170° F. Bring to a boil. Remove from heat, add extract, and return to boil. Total boil is 60 min. Add 0.5 oz. of Fuggle, and cocoa. Boil 10 min and add 2 cinnamon sticks. Boil 20 min. more and add 0.5 oz. of Fuggle hops. Boil 15 min. more and add Irish moss and Golding hop pellets. Boil 10 min. more and break third cinnamon stick into pieces and add. Boil 5 min. more. Remove from heat and cool to 69° F. Pitch yeast.

When fermentation (four days in primary, 10 in secondary) is over, prime and bottle.

OG = 1.060
FG = 1.020

T.J.'s T-Day Ale
(5 gallons, partial mash)

This is a recipe I make every Thanksgiving, one batch to bottle for presents and one batch to serve at home from the keg.

Ingredients:

- 1 lb. crystal malt, 40° Lovibond
- 6 lbs. light malt syrup
- 4 lbs. amber malt syrup
- 0.5 oz. Centennial hops (11% alpha acid) for 60 min.
- 1 oz. Hallertauer (3.5% alpha acid): 0.5 oz. for 60 min., 0.5 oz. for 30 min.
- 5 tsp. pumpkin pie spice
- 1 tsp. Irish moss
- 1 tsp. gypsum
- Australian Ale yeast (G.W Kent Yeast labs A01)
- 1 cup corn sugar for priming
- Gelatin

Step by Step:

Add crystal malt and 1 tsp. gypsum to 5 gal. cold water. Slowly bring to boil, removing grain before full boil. Add extract and return to boil. Total boil is 60 min. Add Centennial and 0.5 oz. Hallertauer hops. Boil 30 min. Add remaining Hallertauer. Boil 20 min. more. Add Irish moss and boil 10 min. more. Pitch yeast at 69° F.

Ferment at 65° to 68° F for four days and transfer to secondary for seven to ten more days. Add spice when racking to secondary.

If you prefer a drier beer add 1 pkg. of champagne yeast at this time (it also kicks the alcohol content up to about 7.25%). After another week, rack to tertiary and add gelatin or similar fining. Rack to keg or prime with corn sugar and bottle. ■

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Stepping Up Your Starter

Mr. Wizard

I have been all-grain brewing for about six years. I usually did 10-gallon batches but started deliberately making 11-gallon batches and canning the extra gallon of wort in one-quart mason jars. I use the unfermented wort to make liquid yeast starters. This way I can honestly say that my entire brewing process is all-grain.

Because the object of making starters is to grow more yeast, how big an increase in starter volume is required to grow more yeast? It seems that too small an increase in starter volume will only feed the yeast cells already there with no increase in cell population. The cells that are there will just eat the new wort and that will be that.

I usually use a factor of 10. If the initial package contains 50 milliliters of starter, I pitch it to a 500 milliliter starter. If I step it up again it will be to 5,000 milliliters of starter. Is this the best way?

Tom Bechard
Rouses Point, N.Y.

The approach you use is the conventional method used to grow yeast in commercial breweries of all sizes. The notion that feeding a yeast slurry with a small volume of wort does not lead to an increase in cell population is indeed correct. In fact most cell suspensions grown under laboratory conditions have a maximum cell density related to the environment in which the culture is grown.

In growing yeast, the oxygen content, specific gravity, and nutritional quality of the wort along with the propagation temperature will affect the maximum cell density of the culture. To keep the population growing the volume must increase. As a rule of thumb increase your propagation volume by a factor of five to 10, making the larger increases occur early and progressively drop as the total volume approaches that required for pitching.

One problem with propagating yeast that bothers many homebrewers is the dilution of the recipe's wort with the propagation wort. The best way to minimize this problem is to allow the last step of your propagation to complete its fermentation and the cells to flocculate (clump and sink). Then you pitch the bottom of the starter. This not only concentrates the yeast cells to a much smaller volume, typically about 5 percent to 10 percent of the propagation volume, but it also selects for flocculent cells from a potential mixture of flocculent and non-flocculent cells.

Many brewers want to know the secret of great beer. In my opinion great beer can only be made time after time if the basics of yeast are understood. The key to yeast is to have it clean, alive, and in sufficient quantity to take off quickly. Your approach to handling is a great start to guaranteeing success with yeast.

Mr. Wizard

I used a recipe calling for eight pounds of British pale two-row, one pound of carapils, and some crystal and chocolate malts. I am using a step mash: 30 minutes at 126° F, 15 minutes at 140° F, one hour at 154° F, and five minutes at 168° F. After the 15-minute beta amylase step at 140° F, I took a sample just for kicks and ran the iodine test; it showed no starch! This was before my 154° F conversion rest.

How can all the starch be converted to sugars this soon? And if it is, why bother with the one-hour conversion rest?

John Qualtrough
Las Cruces, N.M.

One of the most important aspects of measuring anything is to understand what is being measured and how the measuring device works. The iodine test indicates the interaction between iodine and the alpha-helices of amylose starch (amylose is the unbranched form of starch, and amylopectin is the branched form). This interaction causes an absorption of light resulting in a blue-black color. A negative iodine test indicates the absence of large amylose molecules, but it does not by default indicate the presence of fermentable sugars.

The second thing about the iodine test that often leads to confusion is that many people perform the test on the wort floating on top of the mash. The absence of starch in wort does not mean that there is no starch contained in the individual malt particles. To confirm the absence of starch in the mash particle, it is important to get some of the grain pieces and mash them up during the test. This will squeeze out any starch in the grain so that it can react with the iodine.

For the sake of discussion, I'll assume you did not smash some grain and got a negative reaction with the liquid wort. In the mash

profile you described you waited 45 minutes before doing the iodine test, and when you performed the test the mash was 140° F. Although alpha-amylase has an optimal temperature activity at 158° F, it is still active at cooler temperatures. This is no different than an ale yeast fermentation flying at 90° F but still moving at a good clip at 65° F. The rate of enzymatic reactions is dramatically affected by temperature, but the enzymes are active at temperatures below their optimum as long as their substrate — the substance that they act upon — is present.

Because the solubility of malt starch depends on temperature, only some of the malt starch dissolved early in the mash. More will be dissolved when the temperature is increased, especially if you used a coarsely ground malt. The starch that did dissolve may have been broken down by alpha-amylase at a lower temperature. Even if this did not occur, you may not have cooled your sample before performing the test. Adding iodine to a hot sample of amylose starch can lead to a false-negative result because the helical structure of amylose uncoils at elevated temperatures. The iodine test should always be performed on a room-temperature sample.

There is another possible explanation to the problem: your thermometer. One instrument I have learned to mistrust is the themometer, especially dial thermometers. Bi-metallic dial thermometers are notorious for being out of calibration. If you measure the temperature of boiling water and the temperature of a thick ice water slurry and don't get 212° F (this will vary slightly with atmospheric pressure) and 32° F respectively, you've got a thermometer that's out of calibration! Your 140° F rest may have been higher than you thought, allowing significant starch solubilization and degradation by alpha-amylase.

Hopefully one of these ideas is satisfactory to your quandary. On another note, take an iodine test on your last runnings. Most likely, you will discover starch! A traditional brewing practice used to combat this problem is to collect all the wort into the brew kettle prior to heating the wort to boiling. This practice takes advantage of the fact that alpha-amylase activity continues in the kettle (as long as you don't heat it up). Any starch carried into the kettle with the last runnings can then be broken down prior to boiling.

Mr. Wizard

I am using the larger Mr. Beer system, but I hope to upgrade that soon. Is there a way I can dry hop with that system? It relies on the bottle to be the secondary fermenter, but I don't

want to put hops in the bottle and then have to strain everything out before I drink it. The only other option I could think of is to temporarily store the beer in the bottles after primary fermentation, and then transfer the beer back to the barrel (the primary fermenter) to dry hop. But that doesn't seem like a good idea, either. The beer would be carbonated in the barrel, but wouldn't it go flat once it was bottled a second time? Or can I jump-start fermentation for a third time?

Brian Hunsicker
Lehighton, Pa.

The real question at hand is what do you hope to accomplish with dry hopping? The aim of dry hopping is simply to get hop aromas and flavors directly into beer without boiling the hops in the wort. Dry hopping imparts a distinctive aroma to beer that is lost when hops are boiled. Like most aspects of brewing, keeping things simple is the best approach.

Breweries that reuse their yeast tend to add the dry hops after harvesting yeast because the yeast can actually remove some of the dry hop character. The harvested yeast may be used in a different beer that is not dry hopped, and the hop character can be carried with the yeast.

You probably are not reusing yeast — at least not yet. Although yeast can dilute the dry-hopped character, it wouldn't hurt to add the hops right to your primary fermenter. In fact many breweries add dry hops to the primary. The best time to do this is at the end of the primary fermentation to prevent the hops from clogging up your fermentation blow-off. After the hops are added, let the beer stand for at least one week and then carry on as normal.

If you are looking for a more advanced approach to dry hopping, you should buy a glass carboy. After the primary fermentation is complete, rack the beer into the carboy, add the dry hops, and attach an airlock. If possible, transfer the carboy to a cool area of your house (50° to 60° F) and let it stand for at least one week. Then bottle the beer as usual. This method may give better aroma retention because of the lower yeast density in the secondary and will give a clearer finished product.

I could never suggest bottling the beer only to transfer it back to your primary fermenter after cleaning. This method would most likely oxidize the beer and would be a royal pain to perform. The only time you really want to package before dry hopping is if you are dry hopping in a keg and plan to get rid of the hops after consuming the beer. This method, however, does not move the beer out of the package until it is ready for consumption.

Mr. Wizard

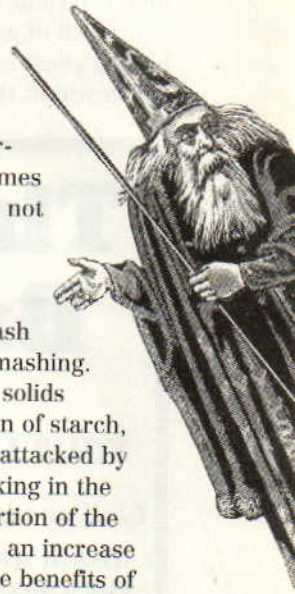
I recently started to brew using all-grain recipes. For mashing I am using a 46-quart cooler with a false bottom and use the temperature control method for the conversion process. I change the temperature by adding heated water to the mash.

Sometimes I don't hit my target temperature with the recommended amount of water for the quantity of grains being used. Instead of adding more water to the mash and creating a thin mash, I have been draining off some of the mash water, bringing it to a boil, and adding it back to the mash until I achieve the temperature I need. Because I am relatively new at all-grain brewing, I don't know all the dos and don'ts of the mash process. Do you see any potential problems with this process?

Ray Nagiewicz
Via e-mail

This method is like the recirculating infusion mash system, except you are boiling portions of the wort. If you were boiling small portions of mash, this would be a decoction mash, so I guess what you are doing should be called the RIM-decoction hybrid mash or RIM-DH mash for short!

This method will not cause any major problems if you are only tweaking your mash temperature a couple of degrees, but could cause major problems if you are using it to do a temperature profile (step) mash. The reason it may cause problems is that the enzymes involved in starch conversion are mainly found in the liquid portion of the mash as opposed to the malt solids. This means that if you want to heat your mash from 140° to 156° F, you must boil a large portion of the mash liquid, destroying a large portion of the mash enzymes in the process. This is not exactly the result you want.



This is why the thick portion of the mash is boiled in decoction mashing. Also, boiling the mash solids increases the extraction of starch, which is subsequently attacked by the mash enzymes lurking in the "rest," or unboiled, portion of the mash. The net effect is an increase in extract as well as the benefits of the temperature profile mash. The one big disadvantage of decoction mashing is that it requires a lot of time and effort as well as a basic understanding of energy balance calculations to ensure successful temperature changes.

If you are happy with infusion mashes, try using 1.44 quarts (46 ounces) of water at 12° F hotter than you want your mash per pound of room temperature malt. Suppose you want a 156° F mash; use 168° F water. Make sure you pre-heat your mash tun. This will get your mash temperature very close to your target, and you probably won't need any temperature adjustment.

Mr. Wizard

I've heard that you can use Fleischmann's active dry yeast to brew ales. Is this true? I know that it is the right genus, but does it have any qualities that make it unsuitable for brewing purposes? It certainly is cheaper than what is generally available at homebrew supply stores.

David Parker
Via e-mail

This indirectly ties into the previous question about yeast propagation. If you want great beer, you must have great yeast. Fleischmann's active dry yeast is great yeast for bread making. Baking yeast is grown under aerobic conditions and is chock full of glycogen. When baking yeast is hydrated in warm water, the glycogen is used by the yeast cell for energy, and a byproduct of this is carbon dioxide. The only thing yeast does for bread is to give it a nice yeasty smell and carbon dioxide for leavening. The beauty of baking yeast is that this happens very, very quickly due to the large quantity of glycogen.

Baking yeast and brewing yeast share genus and species — both are *Saccharomyces cerevisiae* — but the similarities end there. Baking yeast are living gas bags and can be replaced, minus the yeast flavor, with leavening agents such as baking soda (sodium bicarbonate) and baking powders (such as cream of tartar, tartaric acid, monocalcium phosphate, and aluminum sulfate). Brewers yeast, on the other hand, make beer! We make the wort, and the yeast transforms the wort into a complex mixture of alcohols, esters, aldehydes, sulfur compounds, and many other flavor-active compounds.

Get a funky yeast strain and out comes funky beer. Get a contaminated yeast strain and get contaminated beer. Get hold of dead yeast and wild organisms take over. The only thing the brewer can do is make a wort capable of turning into good beer, but it is the yeast that do the conversion.

I have heard of some nice beers made with baking yeast and have also heard many horror stories associated with beers made from baking yeast. When Fleischmann's makes baker's yeast it strives to make the best yeast for bread baking and gives little or no thought to the possible outcome of using its baking yeast for beer brewing. In my estimation, making wort is too time consuming and expensive to take a gamble on yeast to save a couple of bucks. Please take my advice and spend the extra money on fresh yeast intended for beer brewing! ■

Mr. Wizard's Address

Do you have a question for Mr. Wizard? Write to him c/o *Brew Your Own*, 216 F St., #160, Davis, CA 95616. Or send e-mail to wiz@byo.com.

Mr. Wizard, BYO's resident expert, is a leading authority in homebrewing whose identity, like the identity of all superheroes, must be kept confidential.

Big Beers: Brew Now for the Millennium!

by Mikoli Weaver

January is a real beer lover's month. The styles are a towering imperial stout and a very high gravity barleywine that will age the entire year to drink on New Year's Eve of the new millennium. We'll start with the imperial stout so that it can be consumed as soon as possible.

An Export of the Crown

Imperial stouts as a distinct style date to the late 1700s. They suffered a sudden demise around 1917 during World War I when labor and raw materials became essential to the war effort. Perhaps the first such product was brewed by Barclay and Perkins (England) as a warming winter drink that is reported to have gained popularity by its recognition in the court of Catherine the Great of Russia.

Like all beers of the time, imperial stouts received long aging in wooden casks, which added to the flavor of the beer during shipping. The Hartford Brewing Co. in Hartford, Conn., emulates this tradition by aging in cedar. A northwestern brewery recently included imperial stout in an "Oak Series," in which beers were conditioned on long strips of French oak. This is similar to the German procedure of employing hard beechwood for conditioning.

Whether you call them imperial stouts, Russian imperial stouts, or Russian exports, they all mean one thing: big beer.

Imperial stouts are like oatmeal or foreign export stouts in many respects but exhibit more of everything: flavor, color, character, and potency. The Great American Beer Festival and World Beer Cup guidelines suggest these parameters for the style: original gravity 1.075 to 1.090 (19° to 22.5° Plato), alcohol by volume 7 percent to 9 percent, IBU 50 to 80, and color 20-plus SRM.

Some brewers find these guidelines a bit on the watery side. Most of the really good imperial stouts being brewed exist at the upper end or above the guidelines. But then again, that is exactly what they are: guidelines.

Historically, imperial stouts had original gravities in the 1.100 range (25° Plato), making them the most potent and expensive stouts produced. From 1870 to 1917, the Bass brewery produced an imperial called Russian Stout. It was labeled P2, a designation of strength. Other breweries of the day simply used a series of Xs, as is used for strong ales and barleywines.

Today, there is a greater range of gravities posted for the style. For example the famed Samuel Smith Imperial Stout is a low 1.072 (17.6° Plato) with 7 percent alcohol by

volume. British counterpart John Smith Russian Imperial starts at 1.104 (25° to 26° Plato) and has an intense 10 percent alcohol by volume.

The United States has the same uniformity issue with its brewers as well. Popular pioneer Grant's Imperial Stout in 1982 had a starting gravity of 19.5° Plato, in 1990 it was reported at a meager 15.5° Plato, and currently it stands at 18° — still a bit low for an imperial.

Conversely, the Rogue Russian Imperial Stout, another West Coast ale, has an original gravity of 24° to 25° Plato and an alcohol by volume of 9 percent. Brewmaster John Maier describes the beer as "the big brother to the Shakespeare Stout." He uses the typical Harrington for his pale malt base with some Munich and lots of crystal, chocolate, and black patent malts for character. This beer is one of the most delicious imperial stouts made in the United States. From the dark brown head and estery aroma to the forever lingering finish of alcohol and coffee, this beer is a true experience.

Equally notable is North Coast Brewing's Old Rasputin Imperial Stout, named for the Russian "mad monk" who is reported to have had a distinct lust for the imported elixir. Rasputin is listed at 22.5° Plato (1.090) and a well attenuated 11.3 percent alcohol by volume. This beer won the silver medal at the World Beer Cup for 1998. The gold went to Ruffian Imperial Stout from Mountain Valley Brewpub, Suffern, N.Y.

As far as the architecture of an imperial stout goes, it is really not much more than a strong stout. Some breweries consider imperial an amended version of their normal foreign stout. The same amount of grain and the same hop schedule are used, but one-third less volume is collected. This drives the original gravity up from its normal 18° Plato (1.064) to 25° Plato (1.100).

Some brewers make separate recipes for their imperials, while others use a standard stout recipe and fortify the starting gravity by adding malt extract to the boil until the desired gravity is achieved. All of these methods work with grain brewing at home, each with advantages and disadvantages. By fortifying the beer with extract, you can get high gravities using less grain. This is good if your mash tun is small and doesn't hold enough. The downfall is that you have to use extract.

That is why the method of collecting less wort works so well. Chances are that even if you have a large mash tun, you will still not be able to mash enough grain to make a 25° Plato beer in your normal volume. Instead make less, and occasionally use the end runnings to make a small beer. In fact depending on the gravity of your normal stouts, a 15° Plato stout could be mashed to yield one-half the normal amount of wort. Do this twice to yield the full batch size you expect from your system. (The downfall, of course, is time.)

Similarly, if you find that you can't fit all of the grain needed for the recipes given, cut the recipes in half. Be careful to monitor the gravity of the wort to make sure it is high enough. Alternatively, some people have had success steeping the highly roasted grains in the wort for 30 minutes or so before it boils. If you do this, be sure not to let the temperature get over 170° F. There will not be any conversion from dark grains, so all you really want is the extract, color, and flavor. Steeping can do that, just as in an extract brew that uses grains to add to the character.

Traditional ingredients for an imperial stout include pale malts of a British variety, such as Maris Otter. Beeston's Pipkin, a mixture of Maris and Warboys malts, and Halcyon, a cross of Maris and Sargant are good, too. Specialty malts can be pretty simple, including crystal, chocolate, and black malts or roasted barley.

British hop types are most appropriate. Bullion is popular for bittering, and large amounts of Kent Goldings work well for flavor and finishing. Other good choices include Fuggle, Brambling Cross, Target, domestic Northern Brewer, and Willamette.

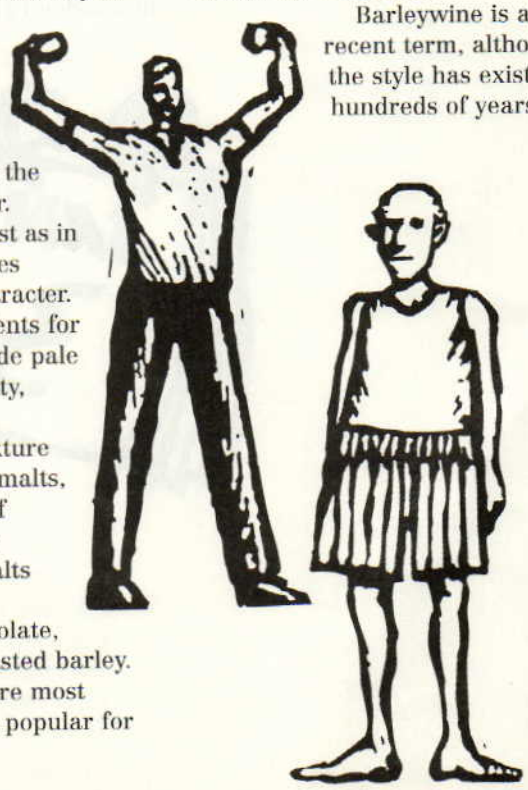
Yeast strains for this style depend on your particular tastes, but a classic English flavor is most traditional. Some choices include Wyeast 1028 (London), 1318 (London III), 1098 (British ale), 1968 (London ESB), and 1056 (American ale) and White Lab's WLP002 (English Ale), WLP005 (British Ale), WLP004 (Irish Ale), and WLP001 (California Ale).

Our imperial stout should shape up as follows: original gravity from 1.096 to 1.100 (24° to 25° Plato), final gravity from 2° to 3° Plato (1.008 to 1.012), alcohol by volume 11.22 percent.

Strength and Age

Barleywine has an undeniable mystique; it is unique as a style and experience. Each year's vintage is anxiously awaited to sample and to savor. Each brewer has his own special methods, ingredients, and secrets that are guarded closer than anything else in brewing. It is a drink made as much for the brewer as it is for the public.

Barleywine is a fairly recent term, although the style has existed for hundreds of years. The



style has evolved from earlier versions known as malt liquors, first sort. These are a distinct relation to aged old ales, which perhaps provided the impetus for the tradition of attaching "old" to the name of the brew.

The barleywines of the early and middle 19th century were dark, strong ales with a high degree of residual sweetness. They were often mixed with weaker, young beers. It wasn't until the 1950s that barleywine was brewed, by Tennant's, as a pale-colored beer. This beer became Witbread gold label and after a great deal of success gave rise to brews such as Fuller's Golden Pride, Bass #1 (now, shamefully, discontinued), and many of the American craft barleywines. And not until recently have barleywines been brewed with a perceptible bitterness.

The flavor profile can range wildly from one brewery to another depending on a multitude of factors, including yeast, grain, temperature of fermentation, final gravity, and the amount of aging given to the barleywine.

An example of this is the comparison of Pike Brewing's Old Bawdy and Rogue Old Crustacean. The Pike barleywine is brewed with peated malt, which gives the finished product a distinct smoky flavor and earthy quality. Head Brewer Fal Allen says the grain bill is a bit different each year, with 30 percent being the largest amount of peated malt ever added. The Rogue, on the other hand, has no peat but is highly hopped, creating the need for long aging to establish the desired balance. Furthermore, the Old Bawdy is darker than the Old "Crusty."

Barleywines by design are in the 1.084 to 1.120 (21° to 30° Plato) range, with terminal gravities of 1.020 to 1.032 (5° to 8° Plato). Alcohol content varies from 8 percent to 13 percent by volume, with bitterness of 50 to 100 IBUs and color of 14 to 22 SRM. This month's recipe lands squarely within these parameters. It starts at 1.108 to 1.112 (27° to 28° Plato) and finishes at 1.020 (5° Plato) to give approximately the same alcohol content, 11.2 percent, as the imperial stout.

The traditional bittering hop Bullion is used at medium levels (about 4.5 AAU per gallon) and Kent Goldings (about 2 AAU per gallon) are used in the finish for flavor and aroma. This is an English-style barleywine, so the flavor tends toward bitterness. If you want to give your barleywine more of an American edge with more bitterness, like the Rogue Old Crustacean (and to a lesser extent the famed Old Foghorn by Anchor and Bigfoot by Sierra Nevada), then use American-type bittering hops in place of the Bullion and as alternates for the Goldings. Good bittering hops are Columbus and Chinook, among others, while aroma varieties for this beer include Liberty, Cascade, and similar types.

This will be a fairly light beer with a distinct copper color coming

January 1999

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1 PREP DAY • Recover from hangover • Start yeast • Assemble ingredients • Soak equipment in sanitizer	**2**
3 BREW DAY • Brew imperial stout • Primary fermentation starts	**4**	**5**	**6**	**7**	**8**	**9**
10 TRANSFER • Transfer Imperial • Rack to secondary • Continue ferment	**11**	**12**	**13**	**14**	**15 PREP DAY** • Start yeast • Assemble ingredients for barleywine • Soak equipment	**16**
17 BREW DAY • Brew Barleywine • Primary fermentation starts	**18**	**19**	**20**	**21**	**22**	**23**
24 RACKING • Prime and bottle imperial stout • Start conditioning for 2-3 weeks and reserve 1 case for cellar	**25**	**26**	**27**	**28**	**29**	**30**
31 TRANSFER • Transfer Barleywine • Rack to secondary, will sit for 2 months before bottling and aging (Mar. 28)						

from the caramel malt and a long boil, along the lines of the classic Tennant's Barleywine. For examples of a traditional dark barleywine, look for Young's Old Nick and Anchor's Old Foghorn.

The procedure for brewing this barleywine is a bit different than normal, starting with an extended mash. You will see from the recipes that the mash lasts 90 minutes to ensure good conversion and to extract all the flavor and color from the grain. The boil is longer than normal as well, with an extra 30 minutes to concentrate the wort (which is an extra one-fourth to one-half gallon more than normal). Because we are dealing with basically the same amount of grain as we are with the imperial stout, the same techniques for dealing with large mashes can be applied here.

The yeast is one that works well in high-gravity environments such as this beer and settles out well in conditioning to give a good, clear beer after aging and carbonation. This is by no means the only yeast to use, but Wyeast's London profile is very nice and the fermentation performance is good, or try White Lab's WLP002 (English Ale) or something similar.

Russian Imperial Stout I
(5 gallons, all-grain)

Ingredients:

- 7 lbs. standard Harrington or Manley pale malt
- 4 lbs. Marris Otter pale malt
- 1 lb. carapils or dextrin type malt
- 2 lbs. crystal malt, 60° Lovibond
- 2 lbs. brown malt
- 0.5 lb. chocolate malt
- 0.5 lb. black malt
- 2.5 oz. Bullion hops (9.1% alpha acid) for 90 min. (22.75 AAUs)
- 2 oz. Kent Goldings hops (5.4% alpha acid) for 15 min. (10.8 AAUs)
- 2 pt. starter of Wyeast 1318 (London III) or similar
- 1/2 cup corn sugar for priming

Step by Step:

Mash grain in 5.25 gal. of water at 150° F for 60 min. Sparge with 168° to 170° F water to collect 5.75 gal. of wort.

Total boil time is 90 min. At beginning of boil add Bullion and boil 75 min. Add Kent Goldings and boil remaining 15 min. Whirlpool and cool to 69° F to pitch starter.

Ferment for seven days, then rack to secondary fermenter and continue for 14 more or until fermentation is done or gravity is about 3° Plato (1.012). If you provided plenty of oxygen for your yeast and pitched a starter, 14 days should be about right. Bottle and age for at least 14 days before drinking.

80 IBUs

Russian Imperial Stout II
(5 gallons, all-grain fortified with extract)

Ingredients:

- 5 lbs. pale malt syrup
- 4 lbs. pale malt
- 2 lbs. Marris Otter malt
- 1 lb. carapils or dextrin type malt
- 2 lbs. crystal malt, 60° Lovibond
- 2 lbs. brown malt
- 0.5 lb. chocolate malt
- 0.5 lb. black malt
- 2.5 oz. Bullion hops (9.1% alpha acid) for 90 min. (22.75 AAUs)
- 2 oz. Kent Goldings hops (5.4% alpha acid) for 15 min. (10.8 AAUs)
- 2 pt. starter of Wyeast 1318 (London III) or similar
- 1/2 cup corn sugar for priming

Step by Step:

Mash grain in 3.75 gal. of water at 150° F for 60 min. Sparge with 168° to 170° F water to collect 5.75 gal. of wort.

Total boil time is 90 min. At beginning of boil add Bullion and boil 75 min. Add Kent Goldings and boil remaining 15 min. Whirlpool and cool to 69° F to pitch starter.

Ferment for seven days then rack to secondary fermenter and continue for 14 more or until fermentation is done or gravity is about 3° Plato (1.012). If you provided plenty of oxygen for your yeast and pitched a starter, 14 days should be about right. Bottle and age for at least 14 days before drinking.

80 IBUs

Russian Imperial Stout
(5 gallons, extract with grain)

Ingredients:

- 10 lbs. pale malt syrup
- 1 lb. carapils or dextrin type malt
- 2 lbs. crystal malt, 60° Lovibond
- 2 lbs. brown malt
- 0.5 lb. chocolate malt
- 0.5 lb. black malt
- 2.25 oz. Bullion hops (9.1% alpha acid) for 60 min. (20.5 AAUs)
- 2 oz. Kent Goldings hops (5.4% alpha acid) for 15 min. (10.8 AAUs)
- 2 pt. starter of Wyeast 1318 (London III) or similar
- 1/2 cup corn sugar for priming

Step by Step:

Start with 5 gal. of 150° F water. Steep grain for 30 min. Sparge grains with enough 170° F water to make 5.5 gal.

Heat to boiling and add extract syrup. Total boil is 60 min. At beginning of boil add Bullion hops, continue boil for 45 min., and add the Kent Goldings. Boil for 15 min. more and whirlpool. Cool to 69° F and pitch starter.

Ferment for seven days, then rack to secondary fermenter and continue for 14 more or until fermentation is done or gravity is about 3° Plato (1.012). If you provided plenty of oxygen for your yeast and pitched a starter, 14 days should be about right. Bottle and age for at least 14 days before drinking.

80 IBUs

Old Squirrely Barleywine
(5 gallons, all-grain)

This barleywine was named for the gray squirrel that got into the brewery the first day it was brewed. But you can name it anything you want.

Ingredients:

- 8 lbs. Marris Otter malt
- 5 lbs. ESB malt
- 1 lb. carapils or dextrin type malt

- 2 lbs. crystal malt, 20° Lovibond
- 1 lb. crystal malt, 60° Lovibond
- Up to 0.5 lb. lightly peated malt (optional)
- 3.5 oz. Fuggle hops (4.2% alpha acid) for 90 min. (14.7 AAUs)
- 2.5 oz. (5.4% alpha acid) Kent Goldings hops: 1.25 oz. for 15 min., 1.25 oz. at end of boil (13.5 AAUs)
- 2 pt. starter of Wyeast 1318 (London III) or similar

Step by Step:

Mash grain in 5.25 gal. of water at 150° F for 90 min. If your mash tun is too small, decrease the Maris Otter to 5 lbs., the ESB to 3 lbs., and add 5 lbs. pale malt syrup to the boil. Sparge with 168° to 170° F water to collect 6 gal. of wort.

Total boil time is 120 min. After 30 min. add Fuggle hops and boil 75 min. more. Add 1.25 oz. Kent Goldings, boil remaining 15 min., and add last Kent Goldings at the end of boil. Whirlpool and cool to 69° F to pitch starter. Aerate/oxygenate well.

Ferment for 14 days, then rack to secondary fermenter and continue for two months or until fermentation is done or gravity is about 5° Plato (1.020). Bottle and age until New Year's Eve. Date and reserve a case for future drinking on New Year's 2001.

70 IBUs

Old Squirrely Barleywine
(5 gallons, extract with grain)

Ingredients:

- 12 lbs. pale malt syrup
- 1 lb. carapils or dextrin type malt
- 2 lbs. crystal malt, 20° Lovibond
- 1 lb. crystal malt, 60° Lovibond
- Up to 0.5 lb. lightly peated malt (optional)
- 3.5 oz. Fuggle hops (4.2% alpha acid) for 90 min. (14.7 AAUs)
- 2.5 oz. Kent Goldings hops (5.4% alpha acid): 1.25 oz. for 15 min., 1.25 oz. at end of boil (13.5 AAUs)
- 2 pt. starter of Wyeast 1318 (London III) or similar

Step by Step:

Start with 5 gal. of 150° F water, steep grain for 30 min. Sparge with 168° to 170° F water to collect 5.75 gal. of wort.

Total boil time is 90 min. At beginning of boil, add Fuggles. Boil 75 min. more. Add Kent Goldings, boil remaining 15 min. Add last Kent Goldings at the end of boil. Whirlpool and cool to 69° F to pitch starter. Aerate/oxygenate well.

Ferment for 14 days, then rack to secondary fermenter and continue for two months or until fermentation is done or gravity is about 5° Plato (1.020). Bottle and age until New Year's Eve. Date and reserve a case for future drinking on New Year's 2001.

70 IBUs ■

Mikoli Weaver is brewmaster at Woodland Brewing Co., Seattle.

The Flavors of Specialty Malt

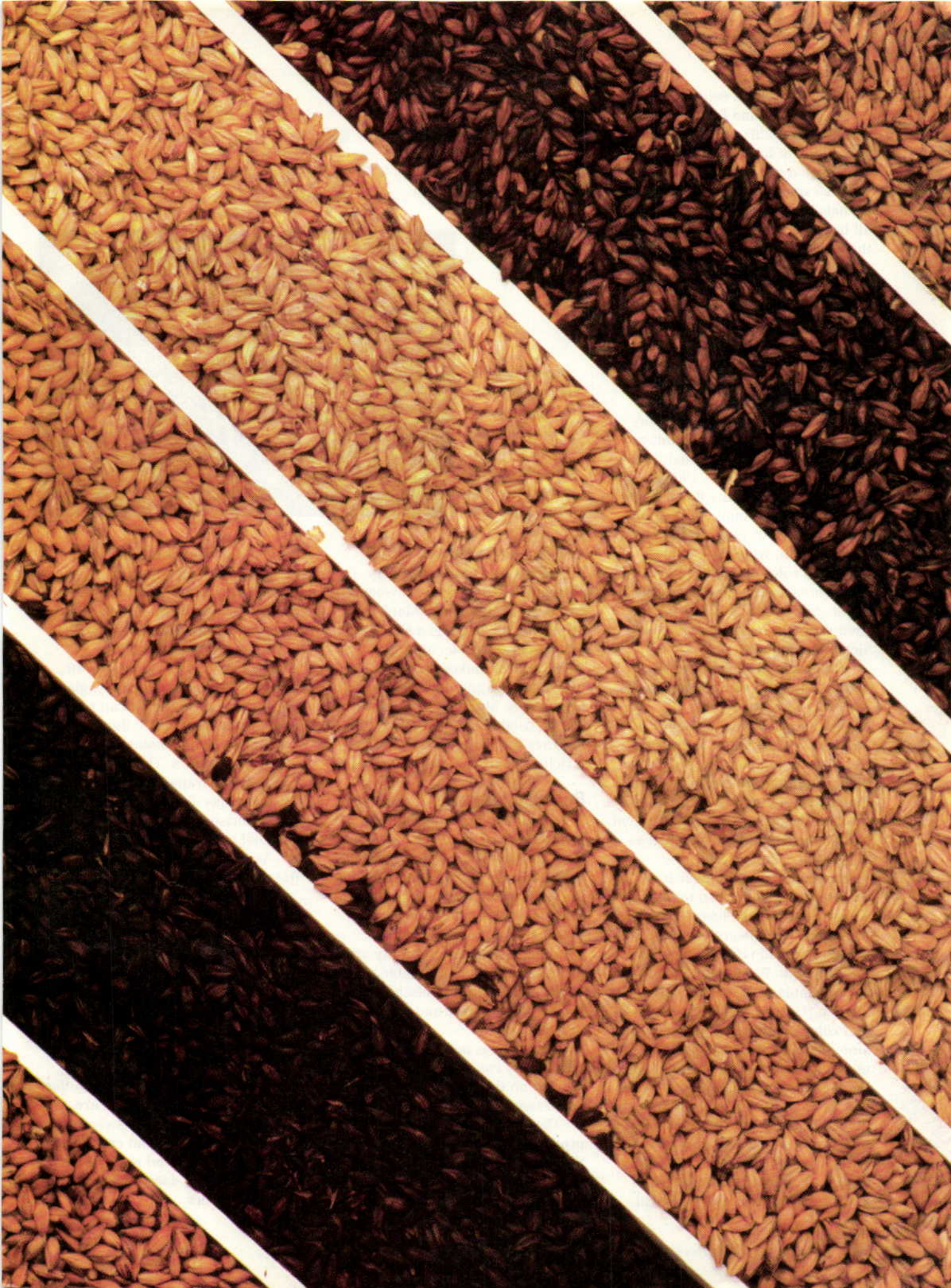
by Mary Anne Gruber

Any maltster will be the first to emphasize that the art of brewing beer starts long before the mash or boil. It starts in the barley field and continues to the malthouse where barley is turned into malt — the fundamental ingredient of beer.

Malting is an age-old process that has evolved into a fascinating interaction of chemistry, modern technology, and good old-fashioned know-how. An experienced maltster relies upon his senses of taste, sight, smell, and touch to guide the grain through the three steps of malting: steeping, germinating, and drying. And while each step is worthy of study and discussion, perhaps the most exciting part of malting is drying, or creating specialty malts. And only with specialty malts can brewers achieve the full flavor and mouthfeel that are the trademarks of craft beer.

Something Special

Specialty malts are any malts other than standard base malt. They're produced by manipulating drying procedures — kilning or roasting green or finished malts, or a combination of both. Specialty malts provide unique characteristics that make craft beer "craft beer,"



including increased color and flavor, increased foam and foam retention, extended shelf life of a beer, and a perception of body or fullness.

That's a tall order from something so small — it takes 14,000 kernels to make one pound. And not all barley is created equal. But that's good because each barley variety produces different flavors and color hues in the finished specialty malt. That makes it possible for brewers to produce different flavors and color hues in the finished beer — from kolsch to stout and everything in between. Any homebrewer's dream.

As a starting point, it's important to note that the final kilning step for a standard base malt is two to four hours at 180° to 190° F. This gives a nice malty flavor and "finishes off" the malt. Turn up the heat another 10° F and you'll make pale ale malt, which has an increased color of 3° to 4° Lovibond. This increased heat increases the flavor. As a result, pale ale malt is used as a base malt in ales, mild ales, IPAs, and ESBs.

Other kilned varieties include Vienna, mild ale, and Munich malts, and wheat and rye.

Mild ale malt and two-row Munich, 10° Lovibond, are derived from curing temperatures slightly higher than those used for pale ale malts. Mild ale malt is well suited for beers that need color adjustment and increased malt flavor, such as alt, kolsch, Oktoberfest, Vienna/märzen, and amber beers.

Brewers should turn to Munich when brewing bock beers. In fact traditional bock beers use up to 90 percent Munich (10° Lovibond) in the grain bill. For many of today's bock formulas, smaller amounts of Munich (10° Lovibond) are an excellent complement when using larger amounts of other dark specialty malts. When brewing Oktoberfest, Vienna/marzen, and amber beers, use 5 percent to 15 percent Munich malt. These malts achieve a balance between the malt and the hops in darker beers.

Up the kilning temperature to 230° to 240° F and maltsters will turn out dark Munich. That will produce a beer that has a very strong malty flavor, 20° Lovibond and deep orange hues. Munich 20° Lovibond also has a slight burnt characteristic, almost a "bite," which makes it perfect for brewing bock and dark beers and brown ales. Munich 20° Lovibond can be used in small amounts to improve the malty flavor and give a rich color to low-gravity brews.

Specialty malts are created in the drying process. Flavor profiles depend on whether the malt is kilned or roasted and at what temperature.

Roasting for Flavor

While kilning can produce a wonderful variety of specialty malts for a wonderful variety of specialty beers, roasting almost certainly puts the "special" in specialty malts. That's because it's in the roaster that malt flavors as varied as caramel, chocolate, and nutty are produced, making it possible to brew anything from kolsch to nut brown ale to porter and everything in between.

A roaster is nothing more than a very slowly rotating drum with heat applied on the outside and heated air drawn through.

Caramel, or crystal, malts are produced in the roaster. The process starts with green malt, which is then "stewed." Stewing the green malt can take place in the germination compartment, the green malt holding hopper, or the roasting drum. The stewing process breaks down starches into additional quantities of sugar. It is during this process that the endosperm changes from a white, mealy appearance to a shiny, glassy appearance. The kernel can reach temperatures of 350° F during roasting, which is maintained for about three hours. The number notation of caramel malt indicates the color specifications and flavor characteristics each particular caramel malt will produce.

As the number increases, so does the flavor intensity.

Pilsner beers use 3 percent to 7 percent caramel (10° Lovibond) to balance the flavors of malty, grainy, and hoppy. In those amounts, it can provide a rich, golden color without a significant flavor increase. Used in slightly higher amounts, caramel 10° Lovibond provides color, sweetness, and body for light amber beers. Caramels are the malt of choice for the many amber beers that are finding favor with today's craft beer lovers. Higher Lovibond caramels, such as 60° Lovibond and higher, are used in red, dark bock, porter, and stout beers.

Probably not as well known or as widely used are the various types of highly roasted malts. Chocolate, coffee, and black malts are all made from kilned, or finished, malt that has been aged for at least 28 days before roasting. During the roasting process, which lasts from two to three hours, the kernel temperature extends well beyond the combustion point of the malt. Maltsters exercise extreme caution when producing these malts, which are clearly distinguished by very dark colors.

The most interesting aspect of these malts is that a very small amount will not change the flavor profile of a beer but will greatly enhance its color. As a result, these malts are used in the production of non-alcohol, low alcohol, and light beers. The increased color suggests that the beer has much more flavor than is typical of a non-alcohol, low alcohol, or lite beer.

Double Malting and Others

Some malt types can be produced through a "double" malting process in which kilned malt is hydrated in the germination compartment, then roasted. This procedure develops very unusual characteristics. Briess Victory malt is a good example of this (as are Hugh Baird and Pauls English amber malts). This malt carries a nutty or freshly baked bread aroma and flavor. It works wonderfully in brown ales, amber and dark beers, and porter. Use just a small quantity of it to give a hint of flavor, almost a "mystique" to a beer.

Black barley used in small amounts gives a "dryness" to stout, while roasted barley offers a sweet, grainy, coffee-like flavor and red to deep brown color to porter, stout, and nut brown ale.

This is merely a sampling of the many specialty malts available to today's homebrewer. Add to that carapils, a Briess "invention" of about 50 years ago. A malt almost glassy in appearance, carapils can be used to upgrade all types of light colored beers and ales. Just a small amount adds body, foam retention, and beer stability without affecting color or flavor. Carapils can be used with or without other specialty malts.

Many more types are being and have been made. In fact the variety of specialty malts available is limited only by the imagination of the maltster and brewer.

All of these varieties make it almost impossible for a homebrewer to ever brew every type of beer he would like to in one lifetime. But with such a variety of specialty malts available to brew such a variety of specialty beers, what brewer would ever want to do that?

Mary Anne Gruber is technical services director for Briess Malting Co., Chilton, Wis.

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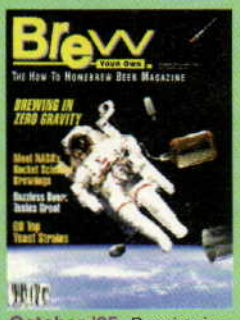

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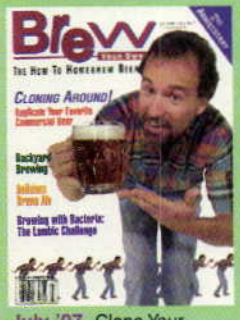

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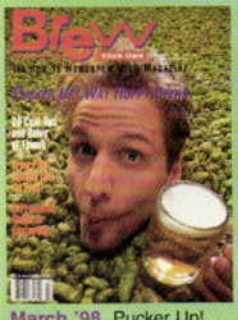

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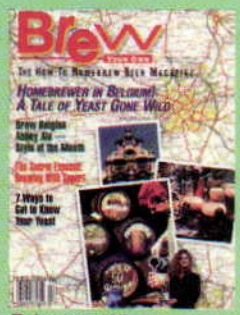

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Alpha-Hop Soup

Figuring Bitterness: IBUs, AAUs, and HBUs

It wasn't too many years ago when most recipes that referred to adding hops usually only mentioned the variety of hops used, the amount, and not much else. This system worked relatively well at a time when hops were available in a few limited varieties and the freshness and quality were often questionable. But as the hobby evolved and became more sophisticated, a better, more precise way to calculate potential bitterness in a homebrew recipe was needed.

One of the simplest ways to more accurately determine bitterness levels and hop usage centers on the International Bitterness Unit (IBU). An IBU can technically be defined as one milligram of iso-alpha acid per liter of beer, which also equals one part per million (ppm).

Exactly what does this mean to us as homebrewers? Most published guidelines for various beer styles quantify the appropriate bitterness or hop level for a particular style in terms of IBUs. These IBU figures can range from as low as six for a classic American pilsner style to 60 or higher for a more bitter beer such as an India pale ale.

Sometimes in brewing literature IBUs are referred to simply as Bitterness Units (BU), but the two terms are the same and are interchangeable. For the sake of simplicity the term IBU will be used here.

by John Oliver

SHAWN TURNER


IBU
Invitational
1
6.5
6

It is important not to confuse IBUs with another common hop bitterness measurement used in homebrewing, the Alpha Acid Unit (AAU), also called the Homebrew Bitterness Unit (HBU). AAUs/HBUs are the bitterness potential of hops based on the percent alpha acid.

The AAU/HBU measurement of a hop addition is determined by multiplying the amount of hops by the hops' alpha acid. While AAU/HBU formulas are quite simple and are still used in homebrewing, they have limited value in determining overall bitterness because they don't factor in length of boil and other important parameters.

IBU calculations are just as simple, much more accurate, and are adaptable to a wider range of brewing situations. However, to be able to meaningfully incorporate IBU figures into brewing, you need to know and understand the basic IBU formula:

$$IBU = \frac{\text{Hops x AA\% x utilization}}{\text{volume x 1.34}}$$

- Hops = the weight of hops in ounces
- AA% = alpha acid percent
- Utilization = the utilization percent
- Volume = the volume of the final batch in gallons
- 1.34 = a constant to convert measurement into US standards

There are many different published IBU formulas, most of which are mathematically very close if not the same. Regardless of which formula you use, the most important things to understand to successfully integrate IBU calculations into your homebrewing are the elements in the formula and how the elements relate to each other.

The Constant

Because one IBU is defined in terms of a metric measurement of one milligram of iso-alpha acid per liter of beer, the constant of 1.34 is used regardless of the other figures in the formula. This automatically converts the results into the standard US measurements of ounces and gallons. For homebrewers who prefer to measure in terms of grams of hops in liters of beer, substituting a constant of 10 ensures the results will be accurate in metric terms.

Finished Batch Volume

For those brewers who are able to boil only a portion of their wort and then must top up with cold water to get to the final volume in the fermenter, it is important to use the final volume and not just the volume boiled with the hops.

The same is true for brewers with monster brewpots who boil a higher volume of wort than will be transferred to the fermenter. This is where IBUs have a big advantage over other hop calculation formulas such as the AAU/HBU. The volume of the batch is actually built into the equation to help calculate the amount of hops to use, making it easy to convert recipes between batches of different sizes.

A few years ago the standard batch of homebrew was five gallons, but today it is not uncommon to see batch sizes of 2.5, 10, and 15 gallons. With the batch size built into the formula, a 30 IBU Dortmunder Export should have the same relative level of bitterness whether it was brewed as five gallons or 50 gallons.

Many of today's commercial craft brewers include IBUs on bottles or six-pack carriers, allowing the homebrewer to research different flavor and bitterness profiles long before filling their own brewpots with their latest creations.

Hop Utilization Percent

Estimates for utilization are based on a vigorous full-wort boil of moderate gravity wort (1.045 to 1.055).

Boil time	% Utilization
60+ minutes	30
45 to 59 minutes	26
20 to 44 minutes	21
10 to 19 minutes	12
less than 10 minutes	0

Weight of Hops Used in Ounces

Most hops are available in premeasured packets of one or two ounces. For brewers using bulk

Standard IBU Formula

$$IBU = \frac{\text{weight of hops in ounces x alpha acid \% x utilization \%}}{\text{volume of final batch in gallons x 1.34*}}$$

**constant to convert measurement into US standards*

Example:

1 oz. of Northern Brewer (10% alpha acid) boiled for 60 minutes in a full-wort boil of moderate gravity wort for a five-gallon batch.

$$IBU = \frac{1 \times 10 \times 30}{5 \times 1.34} = 44.77$$

Let's say you are using last year's recipe but the alpha acid of your hops has changed to 8% alpha acid. You will need to solve for the weight of hops with the new alpha acid percent. Rearrange the formula so that...

$$\text{weight of hops in ounces} = \frac{\text{IBUs desired x volume of final batch in gallons x 1.34*}}{\text{alpha acid percent x utilization percent}}$$

**constant to convert measurement into US standards*

$$\text{oz. hops} = \frac{44.77 \times 5 \times 1.34}{8 \times 30} = 1.25 \text{ oz. hops}$$

hops, a small scale capable of accurately measuring increments down to one-quarter of an ounce is a must.

Alpha Acid Percent

Alpha acids are those compounds within the hop cone that provide the bittering. The alpha acid value that appears on the package indicates the portion of the weight of the hops that is made up of these bittering compounds, usually expressed as a percentage. To obtain accurate results when doing IBU calculations, use only fresh hops, well packaged in oxygen-barrier packaging and properly stored in refrigerated conditions.

Because the alpha acid value that appears on most hop labels is an average value that was attached to the larger package from which the hops originally came, it is important to try to purchase a product that has been packaged and stored to minimize the effects of oxidation and deterioration. This is crucial particularly if you are using whole or leaf hops instead of pellets. If there is no alpha acid value on the label, avoid the package of hops altogether and look for a more reliable product.

This portion of the formula makes it easy to switch among hops of different alpha ratings and helps ensure that a batch of homebrew made with this year's hops will have the same relative bitterness as a batch made last year using a different crop with a different alpha acid rating.

Utilization Percentage — The Key to Consistency

The final variable in the IBU formula is utilization percentage. In a perfect world it would be nice to assume that all of the potential bitterness available from the hops is extracted into the finished beer, but unfortunately that is not the case. Many factors affect the amount of bitterness actually liberated, or isomerized, into the finished product. Some of the more common factors:

Length of Boil: The longer the hops are boiled, the more bitterness is extracted into the finished beer. This is generally good up to about 90 minutes, at which point the law of diminishing returns takes effect and less bitterness is extracted per unit of time. Conversely, late hop additions for flavor or aroma will contribute considerably less bitterness due to the reduced amount of boil time.

Intensity of Boil: Homebrewers using a mega-BTU outdoor cooker can virtually blast the enamel off a steel pot and will have a much more vigorous or intense boil than the homebrewer using an electric range. The more intense and turbulent the boil, the more hop bitterness is extracted.

Volume of Boil: The greater the volume of wort being boiled, the

Why AAUs/HBUs are Helpful

The measurement of Alpha Acid Units, also called Homebrew Bitterness Units, gives the potential bitterness of hops by multiplying the amount of hops used by the hops' percent alpha acid.

AAUs = % alpha x oz.

This number is not useful in determining the bitterness of a beer because it does not take into account such factors as length of boil, gravity of wort, and volume of boil. These (and many other) factors affect the bitterness of a beer. These factors are addressed more closely in the IBU calculation (though still not completely).

AAUs/HBUs are useful as a quick reference when you need to convert a recipe for hops with different alpha acid percentages. If the recipe calls for 2 oz. Northern Brewer with 8 percent alpha acid but your Northern Brewer is 10 percent alpha acid, you can use the AAU calculation to keep your IBUs the same.

For example last year's recipe equaled 16 AAUs (8% alpha x 2 oz.) Reverse the AAU formula to solve for ounces:

oz. = AAUs/% alpha.

For this recipe,

oz. = 16 AAUs/10% alpha

You would need to use 1.6 oz. for the Northern Brewer.

more effective the extraction of hop bitterness will be. Don't confuse this with final wort volume in the IBU formula. For brewers with smaller brewpots who can only do a partial wort boil, it is important to realize that the reduced volume of the boil will reduce the extraction of the hops.

Specific Gravity of Wort: Dense,

Typical IBUs

Style	IBUs
Helles	18-25
Oktoberfest	18-25
Porter	20-30
Pale Ale	20-40
Pilsner	20-45
Stout	30-40
ESB	30-55
California Common	35-45
India Pale Ale	40-60
Barleywine	50-100

Source: AHA Style Guidelines

high-gravity worts with lots of dissolved sugars will reduce the ability of the wort to extract alpha acids in the boil. The purchase of a large-volume brewpot (seven gallons or greater) and the attendant accessories such as a high-output burner is even more appealing when you consider that a reduced wort volume combined with the increased gravity associated with only boiling a portion of the batch and then later topping off to final volume is a double whammy against effective hop bitterness extraction.

Quality of Hops: Old or stale hops will lose some of their alpha acid value. Also, pellet hops usually provide a slightly greater degree of utilization in the boil than their whole leaf counterparts of equal alpha acid value.

Fermentation: The use of a small-volume fermenter and a blow-off tube for the early stages of fermentation will result in a portion of the hop resins being "blown off" with the foam from the kraeusen. In addition, as the yeast flocculates out it will carry with it some of the isomerized bittering compounds.

While there are many published sources that provide specific figures for each of these factors along with involved calculations, utilization percentage can be estimated fairly well. When doing a full-wort boil of moderate gravity (1.045 to 1.055), with hops boiled for 60 minutes or more, assume a utilization of 30 percent. (See Hop Utilization Percent, page 28)

You can make a pretty good estimate of how your own brewing conditions will affect utilization and modify the numbers accordingly. For example if you are unable to do a full-wort boil or the beer you are making is of a relatively strong gravity, then it would probably be safe to assume that the estimate can be factored down by 2 percent to 3 percent.

Go back over your previous recipe records and convert your hop amounts to IBUs. By doing this you can compare what your tastebuds tell you about your latest batch of beer to the published standards for the appropriate styles and begin to develop your own figures with respect to your brewing style and equipment. As this information continues to build, batch after batch, it will become easy to convert among recipes. Multiple hop additions will become easy to calculate by doing a separate IBU calculation for each hop addition and adding together the results to obtain a total bitterness. By experimenting with these numbers, a brewer need never worry about having an over- or under-bittered batch of homebrew again.

John Oliver is a BJCP Certified Judge and performs hop IBU calculations as assistant brewer for BJ's Brewery in Brea, Calif.

Eisbock:

Brew the Beer Money Can't Buy

One of the world's rarest brews, eisbock is not like a beer at all. It is reminiscent of brandies from France, cognacs and armagnacs, but with a malty character that's unmistakable, a roiling estery aroma, and a forever lingering finish. Eisbock develops complexity over months and even years; a great eisbock commands immense respect.

Eisbocks are very rarely produced because they are expensive and must be aged. For the same reasons they make an excellent beer for homebrewing. The unwillingness of larger breweries to produce it maintains the mystique, and it makes a great addition to any brewer's beer cellar.

Eisbocks (ice bocks) are the strongest of the bockbier varieties, starting with a strong doppelbock as the base. They are made using an ice process by which a beer is lagered at 32° F or below during the long secondary fermentation. The water within begins to freeze in the last two or three weeks as the fermentation ceases. At this point the ice is removed, thus increasing the concentration of the finished

by Mikoli Weaver


HOME BREW
Eisbock
Bud Peen

product by 5 to 10 percent.

These frozen elixirs are not to be confused with the multitudes of ice beers in your local grocer's beer case. The mass-marketed ice beers serve their purpose but are nothing like eisbocks. Although more potent than most other institutional lagers they are, in fact, not bocks at all. Most of these types of ice beers are merely cooled to freezing temperatures during conditioning. Some are allowed to actually freeze to a very slight extent then filtered, which separates the beer from the tiny ice crystals that are formed. However, even in the latter example the effect is minimal compared with the authentic product. Most ice beers, in fact, are high-gravity beers watered down at the end of the process to increase the volume.

Was It All a Mistake?

Any discussion of eisbock should begin with the original, Germany's Kulmbacher Reichelbrau Bayrisch G'frorns Eisbock. This beer is the standard by which eisbock is measured. The brewery was named for one of the 1846 founders, Reichel. The brewery was one of the primary producers in Kulmbach with a distinguished line of products. But the eisbock style is said to have been born of a mistake by one of the apprentice brewers who left some of the casks of doppelbock outside. The story, of course, ends well with the potent and delicious product becoming famed and unique.

The name eisbock was given to the beer much in relation to the German eiswein, which is made by pressing frozen grapes so that only the most concentrated portion of sugars and flavor are released. Well, as with most bock stories no one can really prove its validity, but it makes for good conversation to accompany the brew.

Reichelbrau has traditionally brewed the eisbock once a year at the end of August or beginning of September. After extensive aging the beer is honored at an eisbock festival at the local town hall on the last Saturday in March.

Unfortunately, just as this beer was beginning to gain popularity in the rest of the world, it was discontinued in 1996. The Reichelbrau brewery bought the local competitor, EKU (Erste Kulmbacher Unionbrauerei), and the eisbock fell to the wayside in lieu of the potent EKU Kulminator 28, named for the high starting gravity of 28° Plato (1.112 specific gravity). Similarly, the 24 percent on the label of the Reichelbrau betrays the 24° Plato (1.096) of its starting gravity.

The Kulminator is sometimes mistaken for an eisbock, and understandably so. The numbers for the beer place it squarely in the category for an eisbock. Furthermore, the beer undergoes a nine-month lagering process at 28° to 32° F, which forms ice at the top of the beer during the last few weeks. However, the brewery dispels the notion that this beer is an eisbock and claims the amount of ice left behind is minimal.

The ice removed is supposed to clear the beer rather than concentrate it, but the difference is hard to see. It could be, though, that the brewery, in deciding to forego the original eisbock and stay with the Kulminator 28 doppelbock, wanted to preserve the integrity of the name eisbock. And in doing so the brewery may have simply chosen not to use the term in conjunction with the already well-established beer. It really seems to be a technicality, and perhaps EKU Kulminator 28 can be considered an eisbock just as easily as it can a doppelbock.

Those lucky enough have some of the 1995 and the final 1996 Reichelbrau vintage in their cellars. If not, get it if you can. The 1996 vintage produced 46,080 bottles, a total of 1,920 cases.

The Niagara Falls Brewing Co., a division of the Criveller Co. in Canada, is one of the only breweries in the world to produce the style on a regular basis. Subsequently, it has gained a certain amount of recognition in doing so. Beer writer Stephen Beaumont holds an annual Niagara Falls Brewing Eisbock vertical tasting, which is described in his World of Beer journal. The 1993 and 1996 are said to be the best of the last decade, with a warning of contamination in the 1994.

The Hair of the Dog brewery in Portland, Ore., has a beer called Eve, which is touted as an eisbock but is not produced commercially.

As a style by the numbers, the 1998 World Beer Cup guidelines list eisbocks as "German style eisbock" with original gravity of 1.092 to 1.116 (23° to 29° Plato), alcohol by volume of 8.6 percent to 14.4 percent, bitterness of 26 to 33 IBUs, and color of 18° to 50° SRM.

However, the strength and numbers of a bock do not make it an automatic eisbock, nor is this the only area to examine.

Malts and Mashing Techniques

Essentially, the first goal is to brew a strong bockbier to start the ball rolling. This means that you should follow the normal procedures for water treatment and grain selection. Due to the excellent technology in the malthouse, most two-row and six-row malt varieties are low in protein with high diastatic power, lending them to single-infusion mashes at 149° to 154° F. The mash should be allowed to convert for about an hour or until a starch conversion test indicates negative.

Pale malts consist of a mixture of pilsner and Munich, while specialty grains include cara-Munich 20° Lovibond and 60° Lovibond, carapils, and pale chocolate 170° Lovibond.

Kulmbacher Reichelbrau uses five malts, but pinning down the exact types and amounts is difficult. It most likely includes a heavy base of Munich, carapils, some traditional light German crystal (like the 20° Lovibond), some dark German crystal (from 80° to 120° Lovibond), and chocolate malt.

The EKU is made, oddly, of entirely pale malt varieties.

Sparge at 168° to 172° F to yield 168° F water in the grain bed during runoff to deactivate the enzymes.

All of the recipes listed here are formulated for a 90-minute boil with the exception of the extract

versions, which may be boiled just 60 minutes because the syrup has been boiled previously. If for some reason you are not getting the extraction you need and the beer is lower than your target gravity each time, you may wish to consider boiling longer. Keep the hop schedule the same.

The Reichelbrau has an original gravity (before concentration) of about 22° Plato (1.088). The Niagara is considerably less at a reported 15.3° Plato (1.061).

Hop Varieties

As with all bockbiers, use the traditional hops required and get whole flowers if possible. Hops are extremely important to the flavor and character of the beer, even in beers like these in which hops are not the focus. The quality will still show through if you are true to your beer.

Try German Northern Brewer or Perle for the bittering hops, with Hallertauer and Saaz for flavoring and finishing. Remember that the hop contribution to these beers should be for balance.

Yeast Selection and Primary Fermentation

Yeast selection will be the same as if you were choosing a variety for any strong bockbier. Look for a type that gives authentic flavor and is capable of fermenting in high-gravity environments. The attenuation will also be a concern, as you will want the beer to finish in the 1.012 to 1.020 range (3° to 5° Plato) because you are eventually going to concentrate the sugar content. This could mean an attenuation of around 80 percent. But stick with traditional types such as Wyeast 2206 (Bavarian lager) or 2124 (Bohemian lager) or comparable strains, adding more if needed at key points in fermentation and lagering.

For the primary fermentation follow the Reichelbrau and EKU schedules of 10 to 14 days and 17 to 21 days respectively at typical lager temperatures. The Reichelbrau clone should be about 7° Plato (1.028) when it goes into the cold secondary and the EKU clone should be about 8° Plato (1.032) when transferring.

Concentration and Bottle Conditioning

Now that the beer has reached the target gravity and primary fermentation is complete, it is time to concentrate the finished beer. The theory behind the process is simple. You are making the beer stronger by partially freezing it and removing the ice. The alcohol remains, because its freezing point (-173° F) is far below that of water. In addition to pure alcoholic strength, the residual sugars and complex fruit and Maillard (roasted) type grain flavors are enhanced.

The original eisbock, Kulmbacher Reichelbrau, disappeared after the 1996 vintage. The same company now makes EKU Kulminator, which may be an eisbock in disguise.

Much care must be taken with this process, however. As the alcohol and malt flavors are concentrated, so are the undesirable ester (fruity, solvent-like) and aldehyde (green apple) compounds, as well as fusel oil alcohols (spicy, fruity, winelike). Products such as cider and wines are not recommended for this process because of these reasons. Fusel alcohols are more toxic than ethanol. High and low (heads and tails) fusel alcohols from cider are particularly dangerous.

The aging should be a slow process, not something that happens overnight. There are several reasons for this, primarily the reduction of volatiles that were not driven off during the relatively cool fermentation and the overall marriage of flavors.

Kulmbach Reichelbrau and the EKU Kulminator 28 are given a secondary at 28° to 32° F for as many as six months. During this time the gravity drops another four degrees Plato (roughly 16 specific gravity points) and fermentation essentially stalls or moves extremely slowly. The beer then begins to freeze.

At home a simple chest freezer and a Cornelius keg will do the trick. Some other very inventive methods of freezing the beer include separating it into smaller containers to fit into a standard freezer and even putting the beer right into a snowbank in the middle of winter. Again, you will want to pay particular attention to the temperature and the rate of freezing to prevent damage to your kegs and excessive ice formation in your beer. It is reasonable even to remove some of the ice as it forms to be safe.

Remember, even though the beer is cold, it is important to remain sanitary. Also, be sure to measure the volume of ice (melt the ice and measure the amount of liquid) you remove so that you are able to calculate the final strength of the eisbock. Once the top of the beer is frozen you can just as easily siphon or, in the case of a Cornelius keg, push the beer with CO_2.

The long aging process will not only concentrate your beer but will help immensely to clarify it. In fact

there may not be enough active yeast left to adequately bottle condition the beer. (If a sample of the beer is crystal clear, there is not enough yeast.) In this case simply add a fresh pack (one smack pack, not stepped up) of yeast before bottling, being careful not to introduce any excess air to the product during bottling. Usually, this step is unnecessary.

As with any bottle conditioning method, the yeast will metabolize what oxygen is in the beer, if any, but the yeast should not have to have access to a full-blown fermentation. These beers are finishing high in gravity and the bottles will explode if care is not taken.

To calculate the strength of the final beer, use this formula:

C = Volume (start)/Volume (final)

C is the concentration factor that is multiplied by the original gravity (before icing) to yield an "effective original gravity." The final gravity can then be calculated as well, and the values run through an alcohol-by-volume formula to figure your octane. Of course a hydrometer reading will work, too. Warm the sample to room temperature and measure. To figure alcohol content use OG-FG x .1275. For example: OG 1.096 (24° Plato) - FG 1.020 (5° Plato) = 1.076 or 19° Plato. So 76 x .1275 = 9.69 percent by volume.

Brewing or Distilling?

As far as legality goes, there have long been conflicting reports as to whether this process is distillation or not and subsequently requires a separate license. Such exercises can be exceedingly tiresome, so straight from the source: According to the BATF Federal Code of Regulations, remove the water and it is concentration; remove the alcohol and it is considered distillation.

Eis-PA?

Since concentrating doppelbocks by this ice process gives them more depth and character, doesn't it make sense that you could do the same with other styles? The answer is yes, to a certain extent. Other styles are really good as "eis" beers, but for the most part the types that are best suited are the darker, malty varieties such as stouts and also big IPAs. In fact eis-IPAs are really good. However, it takes quite a while for the hop character to soften and, as with other strong ales, for the flavors to integrate and become more harmonious on the palate. But it would make an intense Christmas ale.

Gastronomic Experience

There really is nothing quite like eisbock, not even the strong ales that are so very worldly. It is a unique pairing beer because of its exponential flavoring and potency. Eisbocks are a great deal like port. The younger vintages are sweet and brash with an immature fruitiness. But those with age carry themselves in a stately manner, showing smooth, vinous alcohol character, warming esters, espresso, and nicely balanced sugars. Indeed, eisbocks will sometimes exhibit character just like wines: plum, oak, and smoke to name a few.

With this in mind you will want to pair according to the age of the beer. The newer vintages of up to three years will go well with rich desserts and decadent chocolates, candied fruits, and roasted nuts. The medium-aged vintages, say three to six years, will begin to dry out a bit, lending themselves to hearty entrees a bit more. Food such as broiled meats, fruit glazes, rich pan sauces, and smoked fowl are good complements. And eisbocks that have aged six years or more really start to develop character — if they have not fallen prey to some sort of contamination. The well-aged beers are excellent as drink to complement your meals and for special-occasion toasts, and eisbocks of any age go well with cigars.

Reichelbrau Doppelbock Base

(5 gallons, all grain)

This strong dopplebock will work perfectly as a base for your

eisbock but is good on its own as well. It should yield an original gravity of at least 1.088 (22° Plato).

Ingredients:

- 11 lbs. pale Munich malt
- 1 lb. carapils or dextrin type malt
- 1.5 lbs. crystal malt, 20° Lovibond
- 2 lbs. crystal malt, 80° Lovibond
- 1 lb. chocolate malt
- 0.75 oz. Perle hops (7.3% alpha) for 90 min.
- 1 oz. Hallertauer hops (3.7% alpha); 0.5 oz. for 30 min.,0.5 oz. at end of boil
- Wyeast 2206 (Bavarian Lager), at least 1 pt. of starter

Step by Step:

Mash grains in 5.25 gal. water in a single infusion at 150° F for 60 min. Sparge with 168° to 170° F water to collect 5.5 gal. of wort.

Total boil time is 90 min. At start of boil, add Perle hops and boil for 60 min. Add 0.5 oz. Hallertauer hops and boil for 30 min. more. Add last 0.5 oz. Hallertauer hops and whirlpool. Chill to 45° F and pitch yeast starter. Oxygenate/aerate well.

Ferment at 45° F for four days, allowing the temperature to rise to 50° F on the fourth day. Continue to ferment for six to 10 more days or until the beer has reached 1.028 (7° Plato).

At this point the beer is ready to lager for the ice concentration. Cool the beer to 28° to 32° F, fermenting down to about 3° Plato (1.012), and let the beer form ice on the top. This will take a few weeks. If fermentation ceases, you may have to jump-start it with some actively fermenting slurry as the Reichelbrau brewery does. Once the beer has reached 1.012 (3° Plato), bottle and age at least four weeks in a cool place until it is completely clear.

The amount of ice removed is up to you. The Reichelbrau Eisbock has about 7 percent taken, which is fairly low, but the original gravity of this beer is high to begin with. The higher the levels of alcohol and sugar, the longer the beer will age. But it will require a longer maturation time. Priming sugar should not be necessary because the final gravity is at least the post-fermentation 3° Plato after concentration. However, if there is not sufficient yeast in the beer, you may have to add a fresh packet before bottling.

Reichelbrau Doppelbock Base

(5 gallons, extract with grain)

Ingredients:

- 11 lbs. light malt syrup
- 1 lb. carapils or dextrin type malt
- 1.5 lbs. crystal malt, 20° Lovibond
- 2 lbs. crystal malt, 80° Lovibond
- 1 lb. chocolate malt
- 1 oz. Perle hops (7.3% alpha) for 60 min.
- 1 oz. Hallertauer hops (3.7% alpha): 0.5 oz. for 30 min., 0.5 oz. at end of boil
- Wyeast 2206 (Bavarian Lager), at

least 1 pt. of starter

Step by Step:

Start with 5 gal. of water. Crush and steep the grains (in a nylon sack) at 150° F for 30 min. Drain the sack well and rinse the grain with enough 168° F water to make a total of 5.5 gal. Total boil is 60 min. Stir in syrup. At start of boil, add Perle hops and boil for 30 min. Add 0.5 oz. Hallertauer hops and boil for 30 min. more. Add last 0.5 oz. Hallertauer hops and whirlpool. Chill to 45° F and pitch yeast starter. Oxygenate/aerate really well.

Follow the same fermentation and lagering schedule outlined in the all-grain recipe.

EKU 28 Type Dopplebock
(5 gallons, all-grain)

This recipe uses entirely pale malts, just as the EKU, but do not worry. This beer has plenty of malty character and a surprising amount of color. Its 28° Plato (1.112) makes it a big beer no matter how you look at it.

Ingredients:

- 15 lbs. pale Munich malt, 10° Lovibond
- 3 lbs. pilsner malt
- 1 lb. carapils or dextrin type malt
- 0.75 oz. German Northern Brewer hops (8.5% alpha) for 90 min.
- 1.25 oz. Hallertauer hops (3.7% alpha): 0.75 oz. for 30 min., 0.5 oz. at end of boil
- Wyeast 2206 (Bavarian Lager), at least 1 pt. of starter

Step by Step:

If your mash tun is big enough, mash grains in 6 gal. water in a single infusion at 150° F for 60 min. Sparge with 168° to 170° F water to collect 5.5 gal. of wort. Final runoff gravity will be quite high, allowing for a small beer if desired. If your mash tun is too small, simply mash twice and combine the runoff wort from both before boiling. Keep the first wort above 140° F while waiting so that bacteria will not grow in it, possibly creating off-flavors.

Total boil is 90 min. At start of boil, add Northern Brewer hops and boil for 90 min. Add 0.75 oz. Hallertauer hops and boil for 30 min. more. Add last 0.5 oz. Hallertauer hops and whirlpool. Chill to 45° F and pitch yeast starter.

Ferment at 45° F for seven days, allowing the temperature to rise to 50° F on the seventh day. Continue to ferment for 10 to 14 more days or until the beer has reached 1.032 (8° Plato). At this point you can lager the beer for the ice concentration.

Cool the beer to 28° to 32° F, fermenting down to about 1.016 to 1.020 (4° to 5° Plato), and let the beer form ice on the top. This will take several weeks. If fermentation ceases, you may have to kraeusen with some actively fermenting slurry. Once the beer

has reached 1.016 to 1.020 (4° to 5° Plato), bottle, and age at least four weeks in a cool place until the beer is completely clear. Obviously this is a strong beer, so 5 percent ice removal should be plenty. Then again, some homebrewers are completely crazed and would enjoy a beer of 15 to 20 percent alcohol by volume.

Priming sugar should not be necessary as the final gravity is at least the post-fermentation 1.016 to 1.020 (4° to 5° Plato) after concentration. However, if there is not sufficient live yeast in the beer, you may have to add a fresh packet before bottling.

A beer this strong will really test the attenuative ability of your yeast. There will be a lot of residual sugar, but this is perfectly in style for the EKU.

EKU 28 Type Dopplebock
(5 gallons, extract with grain)

Ingredients:

- 18 lbs. light malt syrup
- 1 lb. carapils or dextrin type malt
- 1 oz. German Northern Brewer hops (8.5% alpha) for 60 min.
- 1.25 oz. Hallertauer hops (3.7% alpha): 0.75 oz. for 30 min., 0.5 oz. at end of boil
- Wyeast 2206 (Bavarian Lager), at least 1 pt. of starter

Step by Step:

Start with 5 gal. of water. Crush and steep the grains (in a nylon sack) at 150° F for 30 min. Drain the sack well and rinse the grain with enough 168° F water to make a total of 5.5 gal. Boil time is 60 min. Stir in syrup. At start of boil, add German Northern Brewer hops and boil for 30 min. Add 0.75 oz. Hallertauer hops and boil for 30 min. more. Add last 0.5 oz. Hallertauer hops and whirlpool. Chill to 45° F and pitch yeast starter. Oxygenate/aerate really well.

Follow the same fermentation and lagering schedule outlined in the all grain recipe.

Mikoli Weaver is head brewer at Woodland Brewing Co., Seattle.

The Growth of Wood

An old aging process makes a comeback

If you have been to your local restaurant brewery lately, you may have noticed that many of the brewers are reviving the old practice of cask conditioning. Some brewers are even going so far as to use wooden casks for fermentation and aging. Using wood in brewing is a long-standing practice. Before plastic and mass-produced stainless steel tanks, wood was necessary for storage.

Wood is still used to facilitate the brewing process (beechwood chips, for instance). Professional brewers also use wood or liquor-infused wood barrels to flavor their beer. Homebrewers can use wood in their brew, too.

Barrels

Historically, most things were shipped in barrels, whether overland or by sea. The cooper (or barrelmaker) was a respected tradesman and the last name of Cooper still exists to show us just how far back the trade goes. It made sense. There certainly weren't any plastics, there weren't the skills at metallurgy we have today, and the technology for bottling carbonated beer didn't really exist until the latter part of the last century.

by Mike Ramsey

TODD HAMMOND

Vanilla, toast, butterscotch, spice. Handled carefully, wood can give your beer a touch of flavor and tradition.

A barrel protects goods much better than a sack and, if made to the proper specifications, can hold liquid. And you know from drawings, paintings, and accounts that the wooden barrel was the standard for beer delivery. The question remains whether the character of the beer was affected by the barrel — and should it be?

In the past, wine was stored in barrels for the same reasons as beer. They were the standard medium of storage. Today, most wines that are aged in wood are aged in oak for the flavor characteristics this storage imparts. However, there are many wines that never see an oak cask and many wineries where you will never see an oak barrel. Furthermore, not all wine aged in barrels picks up flavor from the barrel, even if it's an oak barrel.

Barrels that have been used many times do not impart any flavor directly from the wood itself. Many wineries use these old barrels because they are already on hand, and that's cheaper than buying a new stainless steel tank. However, unlike in the past, almost all present-day wine barrels are made of oak — usually French or American but sometimes German or Hungarian — and are used to impart flavor to the wine when new.

Wood by Any Other Name

Not all oak species have the same flavor characteristics or even any flavor at all. The differences in flavors between French and American oaks are significant, but it is important to note that central and eastern European oak species are very neutral.

Historically, wood of the *Quercus* species (oak) was not the only wood used in beverage storage and aging. During the last century in California, and even into the 1920s and '30s, many wineries had cooperage made of redwood. Those old-growth forests were just ripe for cutting to make quick, convenient, and cheap barrels. Some barrels were open-top numbers the size of a house. Gallo winery still has a whole cellar full of them.

Redwood imparts no flavor characteristics to liquids; it was just cheap and convenient. But now it's all but gone. Not all wood is good or even neutral.

The Greeks stored their wine in pine barrels. Pine sap has a very distinct aroma (and flavor) and is the key flavor component of the Greek wine now known as Retsina. Those who have consumed this stuff agree that it's an acquired taste, and it's no wonder that beer in wood never caught on there.

Another wood associated with brewing is beechwood. You may have heard the term "beechwood aged" and thought that the beer was aged in barrels of beechwood. Actually, in this case the beechwood is in the form of chips or staves that have been boiled and bleached and piled into the aging tank to help keep the yeast in solution. The yeast lodges onto the stacked pieces of beechwood instead of dropping to the bottom of the tank and being covered by still more yeast.

As you might guess, bleaching and boiling a piece of wood removes any flavor character the piece might have. So beechwood is added to improve the process and not impart character.

Flavor Characteristics

Some flavors you can expect from oak aging are vanilla and toasty characteristics. The toasty may range from literally a melba toast aroma to something akin to roasted marshmallow or butterscotch, depending on the treatment of the oak. Some perceived sweetness may be involved, and caramelly notes would also be possible. There may also be astringency from the wood, especially if wood chips are used.

The flavor compounds you can expect from the wood are essentially all of the class of compounds known as phenols. Phenolic compounds make up a huge class of organic compounds that are found in such diverse elements as spice flavorings like curcumin (from turmeric), vanilla, and wintergreen,

Aging in Oak

If you want to try giving your beer oak flavor, the best method is to use a small barrel.

Make absolutely sure that the barrels are clean and sanitized. Cleaning with steam is a good option. If you find a used one you want to try to resurrect, you may need to rehydrate it (by soaking) to bring it back to watertight status.

An alternative to using barrels is to use oak chips, but choose your chips carefully. Avoid chips that closely resemble sawdust. These do not impart the best oak flavors. Try to purchase chips that are actual shavings: curled pieces of oak from barrel stave shapings.

Experiment with your additions, perhaps using one-half ounce of chips in one batch and one ounce in another. Other factors to experiment with include aging time and temperature as well as style of beer.

Remember that the oak flavors should complement or accent flavors in the beer. Generally darker, full-bodied and higher alcohol beers are compatable with oaking, because many of the negative characteristics associated with aging in oak are masked in these beers due to the malt profile. Chips may cause more astringent flavors than oak barrels; beers that are high in IBUs may become too astringent.

When you sample your barrel-aged brew, if you find the flavor too strong, take a page out of the professional's book and mix the oak-aged batch with a carboy-aged batch.

to things such as poison oak and marijuana, to medicines such as aspirin and tetracycline. Beta-lupulone is a phenol (it's a beta acid resin found in hops).

In fact one of the most predominant phenolic flavorings found in oak is vanillin, the phenolic component of vanilla flavoring. Vanillin is much more predominant in American oak than in French oak. Winemakers spend an inordinate amount of time discussing the merits of each. Although most American oak delivers the same flavors, the flavor of French oak can vary depending on where in France it grows. Winemakers even debate which part of the Allier forest yields the best barrels.

Flavors imparted by the barrel can be influenced by how the wood was treated and aged before it was made into a barrel. Also important to the flavor imparted by the wood is what's called the char or "toast." This is the degree to which the wooden staves have been burned inside the barrel. This is usually broken down into one of three categories: light, medium, and dark. Obviously, a dark toast barrel will provide more color and more caramel-type flavors than a light toast. Classic American bourbon whiskey is made with American oak barrels with a dark or heavy toast.

Keeping Tradition Alive

Some British styles of beer, such as Old Ale, are still either cask conditioned or bottle conditioned and corked. Gales Prize Old Ale is probably the best and best known example. These beers can have very characteristic flavors and aromas of acetaldehyde (green apple) and malt vinegar and can be quite sour. There is some evidence that these characteristics may diminish as the bottle ages.

At Traquair House in Scotland, the old mash tun is actually made of wood. Other British breweries still release beer to "the trades" in wooden casks. A portion of Wadsworth 6X and Samuel Smith real ale is conditioned in wooden casks. The portion is then combined with beer not conditioned in a wooden cask.

Steve Parkes, head brewer and lead instructor for the American Brewers Guild, worked for several UK brewers making traditional ales before his move to the United States. According to Parkes, the British brewers aren't interested in getting flavor from the barrel itself and, in fact, do just about everything they can to eliminate any flavors from their wooden firkins.

Just as the Scots have long aged Scotch whisky in barrels that once held sherry or port, microbrewers are doing the same with their beer.

Many Czech breweries use wooden fermenters. And of course, you can't forget the Belgians and particularly the monks that live and brew there! It would be tough to find an abbey beer that hasn't done some time in a barrel. Some of the styles and brands are actually three or four different "beers" blended together. Most are flavored by bacteria and wild yeast. Some of the beer may have been in oak barrels for as long as two years.

In the United States the Firestone Walker Brewing Co., Los Olivos, Calif., uses an open-barrel fermentation system for its Double Barrel Ale. According to Head Brewer Christian August, the object of using barrels at Firestone Walker is to impart wood flavor to the beer. The brewery uses new American oak barrels for fermentation. These barrels see about a solid month of use, then get rotated out.

Not all the beer goes through oak fermentation. August says that the total amounts to less than 20 percent. It was found that any more than that gave the beer too much oak flavor. The beer is pulled off the casks at peak kraeusen (the height of fermentation) and blended into lagering tanks.

Firestone Walker uses a medium toast, which the brewers found gave them the flavor they were looking for. They tried oak chips but found that the chips gave a very different character to the beer than the barrels did. August did some investigating and found that barrel companies use a very low quality oak for their chips and, to a certain extent, for their smaller oak barrels as well.

Other US regional breweries use wooden barrels for open fermentation. These include the Minnesota Brewing Co., St. Paul, Minn., and Lion Brewery in Wilkes-Barre, Pa.

Ghosts of Drinks Past

American microbreweries, such as Denver's Rock Bottom and the Denver Chop House and Brewery (also owned by Rock Bottom Restaurants), are experimenting with a process that the Scots have used for centuries: aging your product in a barrel that once held something else. Just as the Scots have long aged their "water of life," Scotch whisky, in barrels that once held sherry, port, or bourbon whiskey, American microbrewers are doing the same with their beer.

"Mega-micro" brewery Boston Beer Co. ages its Sam Adams Triple Bock in bourbon barrels, and other breweries are using whisky and wine (such as Cabernet Sauvignon) barrels. As you might expect, the beer takes on much of the flavor characteristics of the previous liquid that was in the barrel.

Storing Beer in Barrels

Beer was stored in wood when there were no alternatives. Today brewers choose to use stainless steel and glass instead of wood for good reason. Other than the possibility of the beer taking on some characteristics of the wood itself or what the barrel once held

— which is sometimes desired, depending on your recipe — there are oxidative and microbiological dangers in storing beer in barrels.

Wooden barrels don't keep air away from the contained product as well as glass or metal. In fact in the case of most beverages, especially alcoholic beverages, there is evaporation. This is called in the distilling industry the "angel's share" but is otherwise known as "ullage." If you've ever been within 100 feet of a bonded distillery's aging warehouse, you know about ullage. The alcohol fumes are very apparent. (The term "ullage" is also used in England to describe the spoiled beer that is returned to the brewery.)

Because wine and beer have a lower alcohol percentage than liquor, evaporation is not so dramatic. Winemakers keep extra wine — usually in glass carboys — with which to top off the barrels as the wine ages. Wine has a higher alcohol percentage (around 15 percent) than beer (around 5 percent), so evaporation is even less of a concern for beer makers. If you are planning to keep beer for a year or more in a barrel, you can plan to reserve beer for topping up, but it is really not necessary.

Brewers know that air picked up by the beer during processing or trapped in the bottle or keg during packaging will contribute to staling flavors and oxidative reactions. This is especially true in beers stored in wooden barrels. While topping up limits the headspace, the headspace in beer, as opposed to in wine, contains CO_2 from the carbonation. If you are concerned about oxidation, you should not use wooden barrels.

Because barrels are exposed to oxygen and the beer is kept in what is known as an aerobic environment, it is also quite likely that the beer will be attacked by flor yeasts (the type that make sherry) or wild yeast species such as *Brettanomyces* or *Dekkera*. The latter two are very important in the flavors of some lambics and other Belgian beers but are normally considered spoilage organisms in most wine and beer.

The biggest potential spoiler in the quest to age beer in wood is *Acetobacter*, which essentially is responsible for turning beer into malt vinegar. There is also the danger that *Pediococcus* and *Lactobacillus*, two huge beer-spoiling bacteria genera, could get a foothold in the barrel.

Preparing the Barrels

Winemakers combat the problem of microbiological contamination in ways not open to homebrewers. But if you have picked up some of the marked-down items at your local discount liquor mart, you'll know that not all winemakers are completely successful. However, winemakers do have

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several advantages over brewers in this regard.

First, wine generally has two to three times the alcohol content of beer. Alcohol is a great inhibitor of microorganisms. Second, wine generally has a pH of a full point or more lower than beer. Low pH (or an acidic environment) is a good inhibitor of microorganisms.

The winemaker's most important weapon is sodium metabisulfite. Adding this is called "sulfuring the wine," and any wine that isn't certified organic has most likely had this added. The metabisulfite binds oxygen, which would have oxidized the wine, and also inhibits the growth of microorganisms.

In the past this compound was used in domestic beer (it can still be used abroad, especially in Third World beer). However, today there are strict limits for domestic use, and this compound can be smelled and tasted at much lower quantities in beer than in wine.

Typically, before a barrel is used for wine and each time it is emptied, the interior of the barrel itself receives burning sulfur smoke as well as any sulfur that may be added to the wine in the form of powdered metabisulfite.

According to Parkes, the wooden barrels used for cask ales in Britain did receive a massive dose of metabisulfite after they were returned from the tavern, which would not legally be considered a direct addition to the beer. In addition, steam was applied directly to the interior of each cask until the outside of the cask was hot to the touch.

Rather than fool with metabisulfite and risk spoiling the flavor of your beer at home, try this steam-cleaning method if you wish to experiment with small wooden casks.

Experimentation

At one time the use of wood was a critical part of creating and storing beer. But because of the advances in materials technology, you probably are not interested in the barrels strictly as a medium for storage.

The lengths you need to go to procure one and the space needed to set it up for use almost require that you experiment with wood for the added complexity of flavors it will impart. But experimentation with wood may not be as foolproof as experimenting with a different variety of hops; there are negative flavor compounds associated with wood and there are fewer precedents to follow in your experimentations. Still, if you hit it right, you can have a toasty, vanilla taste of history.

Mike Ramsey is executive brewer for the Arizona-based Hops! Bistro and Brewery group of brewery restaurants. He is BYO's technical editor.

Fermentation Time Line

by Christopher White

Take control of fermentation by learning what to expect at each stage. You'll be able to identify difficulties before they become real problems.

What is yeast doing during beer fermentation? It is consuming wort sugars and turning that sugar into new yeast cells, ethanol, CO_2, and flavor compounds. Brewers are primarily concerned with flavor compounds. To maximize the correct flavor compounds, it is helpful to know how yeast ferments beer.

Ale fermentation of brewer's wort follows three phases: lag phase for three to 15 hours, exponential growth phase for one to four days, and stationary phase of yeast growth for three to 10 days. Here's a brief look at each of the phases in terms of yeast behavior.

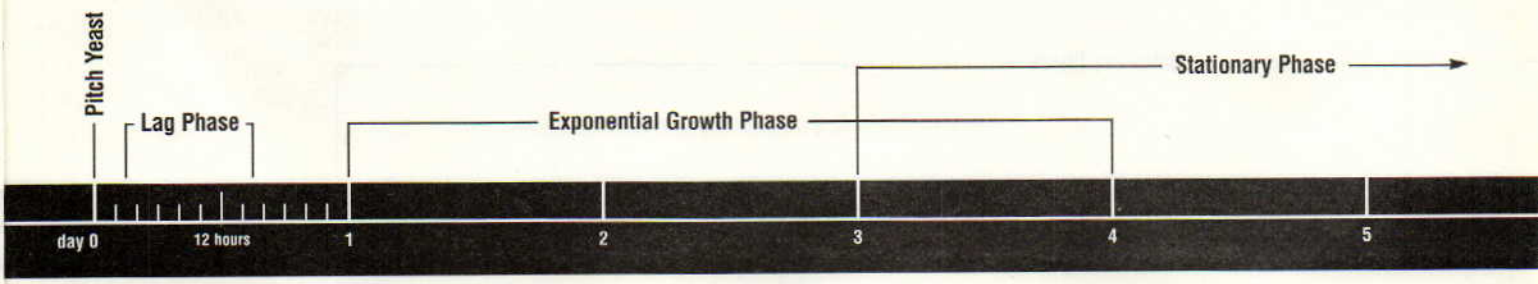
Lag Phase: Three to 15 Hours After Pitching Yeast

When yeast are pitched into beer they begin a process of acclimation to the environment known as the lag phase. Yeast begin to uptake minerals and amino acids from wort. Amino acids are used to build proteins. The amino acids that yeast either can't obtain or can't get fast enough from wort need to be manufactured by the yeast. Much the same way that humans need 100 percent of essential vitamins and minerals to make it though the day, yeast cells also need 100 percent of their vitamins and minerals (nutrients) to make it through a fermentation properly nourished.

All-malt wort is an excellent source of nitrogen, vitamins, and minerals. Most of the vitamins yeast need for proper fermentation are supplied in wort. Some examples of necessary vitamins are riboflavin, insositol, and biotin. Important minerals are phosphorous, sulphur, copper, iron, zinc, potassium, and sodium.

As the vitamins and minerals are taken up from wort, yeast begins to manufacture enzymes necessary for growth. Wort can be supplemented with additional vitamins and minerals by using commercially available yeast nutrients, which will improve the health and performance of yeast.

Oxygen is rapidly absorbed from the wort during the lag phase. The yeast need this oxygen to grow and to produce important cell wall constituents. It is important to introduce enough oxygen into wort at the beginning of fermentation. Shaking the fermenter will, at best, add about half the recommended level of 10 parts per million oxygen into solution. This will produce satisfactory fermentation results, but



to make sure a healthy fermentation will take place, oxygen can be added to the fermenter with any of several commercially available systems.

The lag phase can be carried out at a higher temperature than the rest of fermentation because very few flavor compounds are produced. Ethanol production is also very limited, therefore ester formation is not a concern. Some brewers begin the lag phase for ales at 72° to 75° F and complete the fermentation at 68° F. This can be done successfully for lagers, starting the lag phase at 72° to 75° F and lowering the fermentation temperature to 50° to 55° F.

Brewers will not see any visible activity during the lag phase, hence the name. But this phase is very important in building new, healthy cells able to complete fermentation. If too much yeast is pitched, this will decrease the lag phase, and each individual cell will not be as healthy at the end of fermentation. Although it may be reassuring to see fermentation activity within one hour of pitching, it is not best for the yeast. (It is very difficult for homebrewers to overpitch — even three pints of active slurry is not too much.)

Exponential Growth Phase: One to Four Days

As the yeast comes out of the lag phase, it starts to consume the sugars in solution. CO_2 is produced, which starts to dissipate through the airlock and create a surface layer of foam on the beer. The exponential, or logarithmic, phase of yeast growth is now starting. During this phase, the cell count increases rapidly and ethanol and flavor compounds are produced. Airlocks bubble like crazy during this time frame. The aroma that escapes from the airlock of most neutral ale yeast fermentations has an olive smell.

The exponential phase occurs because yeast rapidly consume sugar. Wort sugar is consumed by yeast in a certain pattern. Glucose is used first, then fructose and sucrose. These are simple sugars and can be quickly shuttled into metabolism. The glucose concentration in wort is roughly 14 percent of wort sugars.

Maltose is the centerpiece sugar of malt and is a very important flavor component. It makes up 59 percent of wort sugars, and its use by yeast gives beer its characteristic flavors. There are one to five genes in yeast DNA that "turn on" in response to maltose, allowing for fermentation by brewer's yeast. After maltose enters the cell through a special uptake mechanism, it is hydrolyzed into glucose units by maltase enzymes. Glucose can then enter the normal metabolism cycle.

Maltotriose is fermented last. This is a tricky sugar for yeast to digest, and some yeast ferment maltotriose better than others. Some strains of brewer's yeast do not ferment maltotriose at all. The more flocculent a yeast strain, the less maltotriose it tends to ferment. The ability to ferment maltotriose gives each strain its characteristic attenuation range (see "Understanding Attenuation," page page 49).

At the height of activity, the beer is said to be at "high kraeusen." The head of foam on top of the fermentation turns yellow to brown. The colors stem primarily from precipitated malt and hop components. Brown spots form from oxidized hop resins.

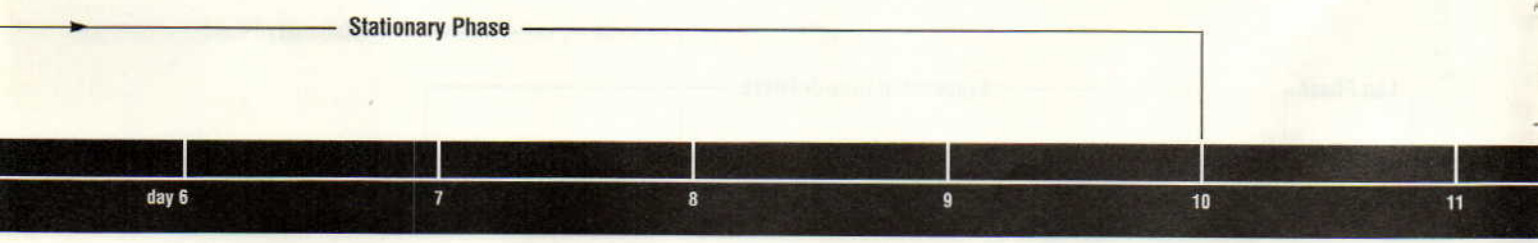
Stationary Phase of Yeast Growth: Three to 10 Days

At this point yeast growth slows down, and yeast enter into a stationary phase of growth. Most of the flavor and aroma compounds have been produced, including fusel alcohols, esters, and sulfur compounds. The beer is referred to as green because it does not yet have the acceptable balance of flavors.

Beer is matured in the stationary phase of growth, also known as the conditioning phase. Yeast reabsorb diacetyl that was produced during fermentation, and hydrogen sulphide escapes from the top of the fermenter as a gas. The kraeusen falls, and yeast begin to settle out, or flocculate. It is important to check the degree of attenuation at this point (by measuring gravity) to confirm that the yeast has completed fermentation. Some strains of yeast begin to flocculate before terminal gravity has been reached and need to be "roused" back into solution.

Professional breweries cool the contents of the fermenter gradually to 35° to 40° F, which forces most of the yeast to flocculate. Most homebrewers do not have the facilities to do this, so they must wait for the fermenter to "clear." If the homebrew is to be bottled, flocculation can be allowed to complete in the bottles. ■

Christopher White is president of White Labs yeast company.



Understanding Attenuation

by Christopher White

Knowing how to check attenuation can give you more control of the way you create recipes.

Yeast is responsible for turning sweet wort into beer. Yeast consume the sugar in wort and turn that sugar into carbon dioxide, alcohol, and flavor compounds. When yeast finish the fermentation process, they shut down, clump together, and fall to the bottom of the fermenter. This process is called flocculation. When yeast flocculate, it is easy to see that fermentation is done. But how can the brewer be sure? What if the flocculation is minimal and yeast and CO_2 stay in solution? How does the brewer really know when fermentation is done? The answer: by testing the degree of attenuation.

Apparent attenuation percentage, often called simply attenuation, is the percentage of sugars that yeast consume. Attenuation varies among different strains. Fermentation conditions and gravity of a particular beer cause the attenuation to vary. Hence each strain of brewer's yeast has a characteristic attenuation range. The range for brewer's yeast is typically between 65 percent and 85 percent.

Attenuation Percentage of Commercial Beers

Beer	Characteristics	%
Guinness Stout	A dry stout, high attenuation	82%
Samuel Smith Oatmeal Stout	Not quite a sweet stout, but not as dry as Guinness	76%
McEwan's Scotch Ale	Scotch ales should have a sweet, malty finish	69%
Anchor Porter	High gravity, robust porter	70%
Heineken	Dry pilsner-style lager	83%

A Little Math

How does a brewer calculate attenuation? First, the specific gravity must be checked with a hydrometer before the yeast is pitched. Specific gravity is a measurement of density. The specific gravity of water is 1.000, and wort has a higher density relative to water because of the sugars present in wort. As these sugars are consumed by yeast during fermentation, the density and therefore specific gravity measurement lowers.

The yeast also produce alcohol, which is lighter than water, so to obtain the "actual" attenuation, alcohol must be removed by heat and replaced by water. Only large breweries go to such lengths to report the actual attenuation, while the attenuation most homebrewers measure is "apparent" attenuation.

The specific gravity measured before pitching, after correcting for temperature, is called the "OG" or original gravity. The OG needs to be logged into a brewer's notebook. Then during fermentation, the specific gravity can be re-checked. The specific gravity will fall toward 1.000 during fermentation, and a brewer can learn much about the fermentation by checking the specific gravity of the beer daily. Once the gravity remains the same for three days in a row, the yeast is most likely done

with fermentation. The specific gravity at the end of fermentation is called "FG" or final gravity. To calculate attenuation percentage, use the following equation:

$$\frac{OG\text{-}FG}{OG\text{-}1} \times 100$$

The only way to know if a yeast has completed fermentation is to check the expected attenuation. Many homebrewers make the mistake of worrying about a beer before they even check the attenuation. A simple check of the specific gravity at the end of fermentation will help in this regard. It is not completely accurate without computing the attenuation. For example if a high-gravity beer is made, the FG will be higher than normal but the expected attenuation for that yeast strain may have been obtained. To obtain expected attenuation numbers, consult a list of yeast strain attenuation figures.

Most manufactures of brewer's yeast list the attenuation ranges of their yeast strains. This can be very useful in matching strains to beer styles. For an American-style pale ale, for example, select a yeast strain that will produce a dry finish and allow for hop flavors to come through. A good choice would be a neutral yeast with an attenuation of 70 percent to 80 percent.

To make an English-style mild ale, choose a yeast strain that does not attenuate as much. An attenuation range of 65 to 70 percent would be more appropriate. Would a yeast strain that attenuates to 80 percent taste bad in an English style mild ale? No, but the beer would not taste true to style.

A Troubleshooting Aid

Many brewers attempt to elevate their brewing skill to handcraft the best beer possible. One simple step is to check attenuation. Not only will this give the brewer information about the batch of beer, but it will also aid in troubleshooting problems. Perhaps the fermentation temperature is too low, and the yeast is not active enough to complete fermentation. The pitching rate of yeast may be too low, so there are not enough cells to complete fermentation. Or in all-grain brewing, the mash temperature may be too high or too low, which will affect the availability of fermentable sugar.

During Prohibition, homebrewers did not regularly check attenuation, hence the stories of bottles blowing up. Bottles will do that today, too, if the beer is bottled well before attenuation is complete. Checking attenuation can improve your brewing skill, improve your recipe formulation, and improve the taste of your homebrew! ■

Christopher White holds a PhD in biochemistry and is president of White Labs yeast company in San Diego.

Finding Balance With Coffee Beer

by Stan Hieronymus and Daria Labinsky

Brewer: Amahl Turczyn
Brewery: Wolf Tongue Brewery
Years of experience: Pro two years, homebrewer 10 years
Brewer: Gordon Knight
Brewery: Wolf Tongue Brewery
Years of experience: Pro six years, homebrewer 10 years
House Beers: Coffee Porter, Mountain Berry, Mr. Hoppy (pale ale), Ned Red

Wolf Tongue Brewery

"I know some homebrewers will use a coffee maker. You can do that, but you get a little smoother, mellower flavor from the coffee if (the steeping) is done at a cold temperature."

Brewer: Amahl Turczyn

In most cases brewers use coffee because they want to make a beer that tastes like coffee. Copper Tank Brewing Co. of Dallas, for example, took home the Great American Beer Festival gold in the Herb/Spice category for Mocha Maddness, an eye-opening beer with a heavy coffee aroma and flavor and a sharp hop finish.

Mountain Sun Pub & Brewery in Boulder, Colo., also brews a coffee beer with a distinct coffee flavor.

At Wolf Tongue Brewery in Nederland, Colo., the philosophy is a little different. Brewers Gordon Knight and Amahl Turczyn prefer flavorings to be more subtle.

"I want you to taste the beer first," says Knight, Wolf Tongue's head brewer. He is speaking specifically of the brewery's Mountain Berry, an outstanding raspberry beer, but he is also referring to his overall strategy in making flavored beers. He believes in balance. While the nose is sweet and the raspberry adds tartness, this is clearly a beer.

The same applies to the brewery's Coffee Porter. Knight decided to brew a beer with coffee after tasting Java Porter at Mountain Sun Pub & Brewery. The result, based on a brown porter, was a considerably different beer.

"You just get a hint of coffee," says Wolf Tongue Manager Jim Parker, an experienced brewer himself. "You kinda go, 'huh, what is that?'

"I love the Mountain Sun Java, but it has a lot more coffee character," Parker says. "That's the beauty of it; even in something as esoteric as a coffee beer you can have a range of choices. That's what makes brewing great."

The flavor of coffee porter is achieved by steeping ground coffee then adding the coffee to the conditioning tank, says Turczyn, Wolf Tongue's assistant brewer. The result gives the beer a roasty character but without harsh bitterness. Steeping also takes away some of the oil, which can change the mouthfeel. Using beans instead of ground coffee will add bitterness and oiliness.

Wolf Tongue uses three pounds of coffee steeped in one gallon of water for a five-hectoliter batch. The water is boiled and then chilled before the ground coffee is added. Turczyn recommends adding the grounds to 45° F water and allowing that to reach room

temperature while steeping for 24 hours.

"I know some homebrewers will use a coffee maker," says Turczyn, an avid homebrewer. "You can do that, but you get a little smoother, mellower flavor from the coffee if (the steeping) is done at a cold temperature."

After the mix steeps, Turczyn strains it through a cheesecloth (although he and Parker have also discussed using nylon netting) before adding it to the conditioning tank. The brewery doesn't filter beer, but whatever grounds are left settle to the bottom.

A lot of homebrewers are tempted to add the coffee during the boil for sanitation reasons, Turczyn says, "but if you practice good sanitation it is better to add it at the end. This is true for all spices," he says.

A comparable amount of coffee for a five-gallon batch is about five-eighths of a cup. Parker suggests starting on the light side and experimenting from there. "Knight has cut down on the amount he uses and still gets the same flavor," Parker says.

Wolf Tongue uses 100 percent Colombian coffee. "I wouldn't recommend using flavored coffees, because of some of the things they put in for flavor, including sugar," Parker says. "Think of using your coffee beans like another grain.

"The Colombian provides a rounded flavor, like another chocolate grain. Espresso would be more like roasted barley, which isn't appropriate in a brown porter," he says. Some breweries use espresso to make stout, for which a roasty nature and the additional bitterness the coffee adds may be appropriate.

As long as you get good quality coffee, says Turczyn, you will get a nice flavor. He even suggests experimenting with different gourmet coffees for fun. There are certain darker varieties, especially, that impart good flavor.

For those concerned about caffeine, Turczyn has two words of advice: Don't be. Wolf Tongue uses

The Tips

- **Boil water and chill.**
- **Steep grounds at room temperature for 24 hours.**
- **Add coffee to fermenter for best flavor.**
- **Strain with cheesecloth or screen.**
- **Use coffee sparingly, as you would spices.**
- **Experiment. Try different blends with different beers.**

fully leaded coffee, and he suggests homebrewers do the same. The coffee is so diluted that unless you're really sensitive to caffeine, it shouldn't be a problem. To be affected, he notes, "you would have to drink a lot of porter."

Coffee and porter seem a natural pairing, but Turczyn suggests trying other dark beers. He knows a brewer who has had great success adding coffee to an imperial stout. He cautions against adding coffee to a brown or IPA, for example. "A brown might be too delicate to add coffee to. But the coffee will definitely complement anything with a large amount of roast malt or black malt," he says.

Turczyn suggests using coffee as you would spices. "If you're going to put spice in a beer, you don't want to overwhelm the hops," he says. That doesn't mean adding more hops but making sure the coffee is subtle and the flavors balance. If the taste isn't strong enough, you can always add more, he says.

The five-hectoliter (about four-barrel, or 124-gallon) system on which Turczyn and Knight brew is the one Jeff Lebesch and Kim Jordan used when they started New Belgium Brewing Co. in their Fort Collins, Colo., basement in 1991. Since Knight bought that system in 1993 it has traveled with him through three different breweries: High Country, Estes Park, and Wolf Tongue.

◆

Coffee will definitely complement any beer that has a large amount of roast malt or black malt.

◆

It is also on this system that he has produced several different gold medal beers. Wolf Tongue captured gold in the GABF's Brown Porter category for Coffee Porter in 1998 and High Country grabbed gold for Renegade Red, an India pale ale, in 1993.

Wolf Tongue keeps five beers on tap year-round, including the berry and porter. Miner's Gold is a light pale ale made with Hugh Baird malt and Saaz hops. Its color leads you to believe that Miner's Gold will be a lightweight beer, but it's quite malty and hoppy throughout. On Thursdays the pub sets up a beer engine and serves Miner's Gold on cask.

Ned Red is a malty, dark amber ale brewed with Cascade hops. "It's well balanced and very drinkable," Parker says. Ned Red is a big seller for the brewpub, which will go through eight kegs in seven to nine days.

The American pale ale, Mr. Hoppy, is brewed with Great Western and Hugh Baird malts and "a ton of Chinook," says Parker. While hops predominate in the aroma and flavor, the beer is considerably malty. "It's not hop water," Parker says.

All the beers are fermented with Wyeast 1056 American ale yeast. Wolf Tongue, which opened in 1997, is just the place for people who are looking for a brewpub that's more pub than restaurant.

The pub was once an assay office, then a veterans' Bud bar. It's still very much a "local," selling 17 cases of Budweiser a week and providing a comfortable place to hang out, play darts, shoot pool, play foosball and video games, or grab a controller for NTN (the interactive television service that features trivia and sports games).

◆

If you're going to put spice in a beer, don't overwhelm the hops. Don't add more hops; just make sure the spice is subtle.

◆

It's rustic, with a pot-bellied stove, a fine moosehead, lots of wood, and furniture that looks like it's made out of logs. The menu features pizza, calzones, and sandwiches.

Since joining the brewpub in April, Parker, former beer writer, brewer, and director of the American Homebrewers Association, has repainted the place to look more like a pub. He has also changed the logo and put more of a focus on beer. Draft sales have rocketed. In fact the brewhouse was straining to keep up before the GABF medal boosted business. Unless room is made for more conditioning tanks, Knight and Turczyn will continue to be able to brew just twice a week. ■

Stan Hieronymus and Daria Labinsky are authors of the Beer Travelers Guide, *which lists more than 1,700 US brewpubs, bars, and restaurants that serve flavorful beer.*

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Easy Steps to Great Sparkling Wine

by Alison Crowe

Ah, another holiday season come and gone. The family thought your 1997 Chardonnay went great with the turkey, and the after-dinner crowd loved your port-style Barbera. In fact they were still smacking their lips long after the dessert dishes were cleared away and demanded that you give them the recipe — not for the chocolate torte but for the wine.

It seems you're a pretty talented (and most assuredly appreciated) winemaker. Barrel fermentation, red wine maceration, and even dessert wine making — you can do it all. But have you ever thought about sparkling wine? It may sound a little involved, but anyone who can make a clean white wine and knows a bit about secondary fermentation (think adding priming sugar like homebrewers do) can whip up a killer champagne-style sparkling wine. Starting with wine you made during the 1998 harvest, you can have your own "chateau's" *grande tete de cuvee* ready in about three months, just in time for the springtime holiday season, June weddings, or any time you need to add a little sparkle to your life.

Champagne should take nine months from start to finish, including making the base wine. There are three processing stages. Each stage has its own list of equipment and ingredients. Read the directions thoroughly before engaging in this rewarding but potentially time-consuming endeavor. This recipe was adapted from a sparkling wine recipe in *Winemaking* by Stanley and Dorothy Anderson (Harcourt Brace & Co., 1989).

Making It Sparkle

Stage One involves the reinoculation of the cuvee. In this stage you'll be taking your base wine (the cuvee) and introducing some sugar and yeast into it. When the cuvee is cloudy with gently fermenting yeast, you'll bottle it in Stage Two.

Bottling up the fermenting cuvee is what gives the wine its sparkle. The yeast will continue to ferment the added sugar in the sealed bottles, producing alcohol and a small amount of carbon dioxide. The carbon dioxide gas will dissolve into solution and the yeast cells will die out, leaving a thick layer of lees (spent yeast cells) on the bottom of the bottles.

This thick layer is rather ugly and could cause spoilage problems or off-odors later. So in Stage Three you'll chill the wine and decant it into another bottle to which you've added the dosage (a final addition of some distilled alcohol, wine conditioner, and some of the original cuvee — pronounced *doe sahj'*). This stage is necessary to take the sparkling wine to its long-awaited finish. By chilling the bottles in the freezer and then carefully pouring the sparkling wine off the lees into another bottle (to which you've added the dosage), you clarify the wine and balance its body and texture a bit so it's ready to drink.

The wine conditioner provides the wine with a touch of sugar, but don't be surprised if you don't taste it in the final product. Base wine cuvees used to make sparkling wines are purposely made high in acid so the resulting sparkling wine will be as well. It's the high acid content that makes sparkling wine so crisp and refreshing that it just sometimes takes a little extra sugar (this time we've used an unfermentable sugar) to balance out the final taste profile of the wine.

BREWER'S MARKETPLACE

Stage One: Reinoculation

Equipment:

- 750-ml standard wine bottle with plastic closure (screw cap works)
- A jug of strong sanitization fluid — a strong sulfite solution (80 parts per million) works well
- Standard five-gallon glass carboy, well-sanitized
- A sanitized glass or plastic pitcher that can hold at least 3/4 of a bottle
- Small bowl or one-cup measure
- Fermentation lock half filled with a strong sulfite solution (80 ppm)
- Stirring spoon
- Siphon hose

Ingredients:

The ingredients below take 24 hours to process. You'll need five gallons of a fined, filtered, and chillproofed white wine, at least six months old, to act as your cuvee or base wine. The wine should be sound, dry, and neutral. Sugar should be 0.00 or very close to it. The pH should be 3 to 3.4, titratable acidity should be 6.5 to 7 gram per liter, and alcohol should be 10 percent to 12 percent. A total of 750 milliliters of this will be immediately bottled and set aside for later use in stage three as part of the dosage.

Additional ingredients include:

- 13 oz. (390 g) cane sugar
- 5 tsp. yeast nutrient
- 1 cup warm (slightly above body temperature) water
- 2 packets champagne wine yeast, 5 g. each

Step by Step:

1. Siphon 750 milliliters of your cuvee into a wine bottle with the plastic closure or screw cap. Close tightly and store in your fridge for use as the dosage in stage three.

2. Siphon off 480 milliliters of your cuvee into the pitcher. Dump in the sugar and the yeast nutrient and stir until everything is dissolved.

3. Dump the yeast into the warm water. Do not stir. Let stand 10 minutes or until bubbly and active.

4. Pour the sugar and yeast nutrient mixture into your clean, sanitized carboy. Add the bubbling and active yeast.

5. Siphon the rest of your white cuvee from its carboy into the new one. When the siphon finishes, give the cuvee a good stir and attach the fermentation lock.

6. Let the newly inoculated cuvee stand in a fairly warm place (70° to 80° F) for 24 hours.

Stage Two: Bottling the Fermenting Cuvee

Equipment:

- 25 750-ml champagne bottles
- Metal crown caps (used in beer bottling)
- Crown capper (rent at your local homebrewing store)
- Bottle washer

Step by Step:

This stage takes a total of three months.

1. After a day or so, or when the cuvee is cloudy with growing yeast, get out the champagne bottles, crown caps, and the capper.

2. Give the bottles a good washing with hot water — but don't sulfite them! This might kill the yeast that you're trying to grow inside the bottles.

3. Take the fermentation lock off of the carboy and give the whole thing a good stir with the long handle of the spoon.

4. Siphon the cloudy cuvee into the champagne bottles, leaving about one inch of headspace.

5. Cap the bottles with crown caps, just as you would beer bottles.

6. Store the bottles upright in a cool (65° to 75° F), out-of-the-way location for two months. Seldom-used closets work well, as do basements and quiet corners of garages. Just make sure not to put the bottles in a place where the temperatures could get too hot.

7. Twice a week during this time, carefully invert the bottles and shake gently. The object is to encourage the yeast inside the bottle to ferment the added sugar to completion.

A word of warning: Because there are live yeast cells eating up sugar and making carbon dioxide

inside the sealed bottles, there is a lot of gas building up under pressure. Be very careful when handling the bottles. Always wear protective eye gear and gloves, and be sure to store the bottles away from inquisitive children and pets.

8. After two months, give the bottles one final shake and then let the bottles rest (standing upright) undisturbed for one month. During this time the yeast will die out and a thick layer of lees, or spent yeast hulls, will develop on the bottom of each bottle.

Stage Three: Decanting and Rebottling

Equipment:

- 25 750-ml champagne bottles
- 25 plastic champagne corks
- 25 champagne cork wires
- Lab goggles (or other OSHA safety glasses)
- Gloves (thick rubber, leather, etc.)
- Set of measuring spoons
- Enough space in your freezer and fridge to be able to hold at least five wine bottles at a time — the more you can hold, the faster this stage goes

Ingredients:

- 240 ml neutral vodka
- 360 ml wine conditioner
- 750 ml (one wine bottle full) of the cuvee (set aside at the beginning)

Step by Step:

1. Dig out the 25 champagne bottles that have been resting for a month. Stash them in your freezer, if they'll all fit. If not, the following steps can be done in batches. These steps are written assuming that there is space for 10 wine bottles in the freezer.

2. Put five of the full champagne bottles in the freezer.

3. Use hot water to wash the 25 new champagne bottles. Again, do not sulfite them.

4. Mix a dosage by combining the vodka, wine conditioner, and cuvee (that you set aside three months ago in the fridge) in the pitcher.

5. Pour two tablespoons of the dosage mixture into five of the just-washed champagne bottles.

6. Put these five bottles in the freezer. Stand them upright next to their full counterparts.

7. When ice has just started to form on the five full cuvee bottles, take them out of the freezer, remove the cap from each one carefully in turn, and pour its contents gently into one of the bottles that contains the frozen dosage. Be careful not to pour the entire contents in; you want to leave behind the gooky stuff (the lees) at the bottom of the cuvee bottle.

8. Quickly insert a plastic champagne cork and fasten with wire or, alternately, just put crown caps on the new bottles if you can't fathom the notion of plastic champagne corks.

9. Repeat the above steps with batches of five cuvee bottles at a time.

10. When done, store the bottles upright in a cool, dry, dark place.

11. When the dosage has thawed in the bottom of the bottle, swirl the bottles gently to mix the cuvee and dosage together.

12. Store bottles in a cool, dry place, and be sure to chill each bottle thoroughly before serving. ■

Alison Crowe is a graduate of the University of California, Davis, winemaking program and works in the university's Department of Viticulture and Enology.

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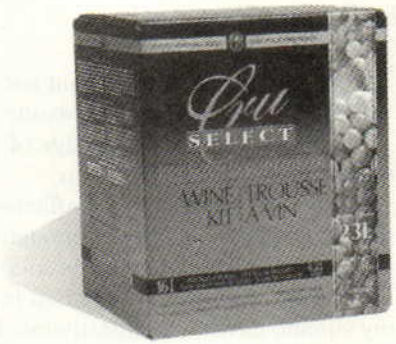

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Homebrew: Chicks Dig It

by Douglas Harwood

When my ex-girlfriend left town to accept an exotic job on the other edge of the continent, we hadn't been speaking for months. It still affected me badly, however. I felt as though she had been able to move on and up without me while I stagnated in my squalid downtown apartment. To make matters worse, the only reason she told me she was leaving was to see if I would become guardian of her parrot, a bird that always hated me and spends the days loudly calling her name. "You're still the most reliable person in my life," she'd said. I took the bird.

The bird and I quickly became reclusive as my life became quieter and more desperate. My friends and family worried about my new hermit lifestyle, so they dragged me around wherever they went. My sister was worst of all. "She wasn't good for you," she'd say. "She was always mad at you for no reason. You need someone much less crazy. You need someone more fun." So it was my sister who dealt me the ultimate humiliation: a blind date.

I was assured it was a match. "She loves to go out drinking and dancing and she has really big boobs," my sister said. I thought that my sister didn't know me. The stage was set for another demoralizing tragedy, but my number was given out anyway.

When the phone rang and a woman's voice I didn't recognize asked for me, I was sure that she was calling to tell me that my phone bill was overdue. When I realized it was my sister's friend I panicked. Let me tell you, only when you are trying to impress a stranger with your wit and wisdom is it possible to make yourself out to be so boring. As I described myself I suddenly realized that my job is actually quite boring. I only go to boring places in my boring car. Even my taste in books and movies is boring. Five minutes on the phone felt like eternity.

Then I remembered the ace up my sleeve, "Oh...and I brew beer." The conversation livened up some.

"Really? How?"

I briefly explained.

"That is so cool," she said, then paused. "How do you get the bottle caps on?"

We made a date. Out for a movie, a few beers, a few rounds of pool. When I drove her home we talked about how much fun we'd had and when we'd do it again. The next time we went out we went to a brewpub. She found a brew she particularly loved and, "what a coincidence..." one that I brew particularly well.

My sister deserves a hug for setting me up on a blind date.

"You can brew this?"

"Yup."

"Is it this good? My father tried to make wine," she said, wrinkling her nose.

"Depends on who you ask, I guess."

"Y'know, you could run a place like this," she said, glancing around the pub.

"Sure," I said, smirking at her naivete.

"No, really. I know some people who are trying to get a little bar going."

"You haven't even tasted my beer," I said, secretly allowing myself to share the little fantasy.

"Well you'll just have to let me brew with you sometime and we'll do some sampling."

That sounded good to me. We set a date and the next day I started to prepare. I thoroughly cleaned my apartment from the dishes to the bathtub. I removed any obvious remnant of my ex-girlfriend: photographs, toothbrush, cosmetics, and the rest of the junk in the medicine cabinet. I went to the brew store a week in advance and I pulled out and polished all my most impressive brew equipment: 20-gallon brew pot with the thermometer, electric grain mill, and my homemade counterflow wort chiller that is far too huge to be practical but still looks really cool. Slight overkill for a five-gallon kit batch, but she wouldn't know that.

As I was putting a case in the refrigerator and some pint glasses in the freezer my sister called. She told me that her friend is looking forward to tonight. I'm glad and excited. But I wish I knew how to shut that bird up for the evening. ■

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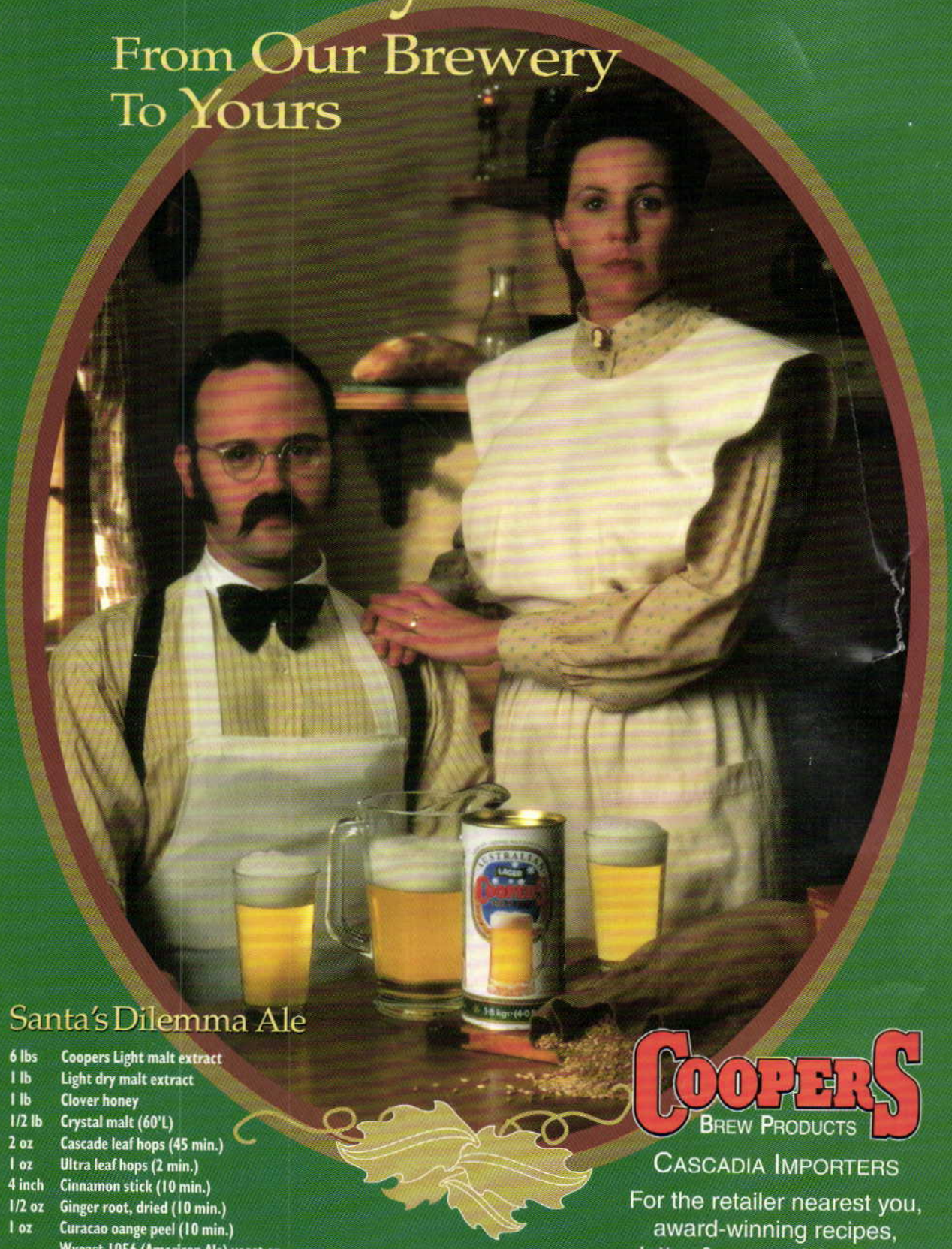

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