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Brew Your Own

THE HOW-TO HOMEBREW BEER MAGAZINE

OCTOBER 2012, VOL.18, NO.6

IPA 2.0

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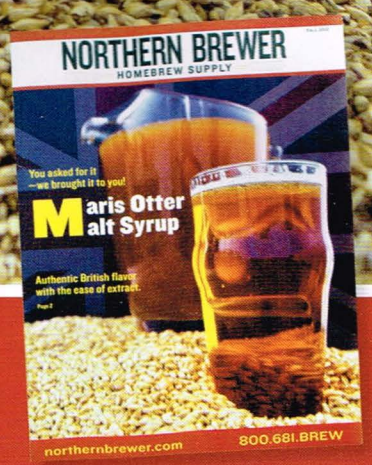

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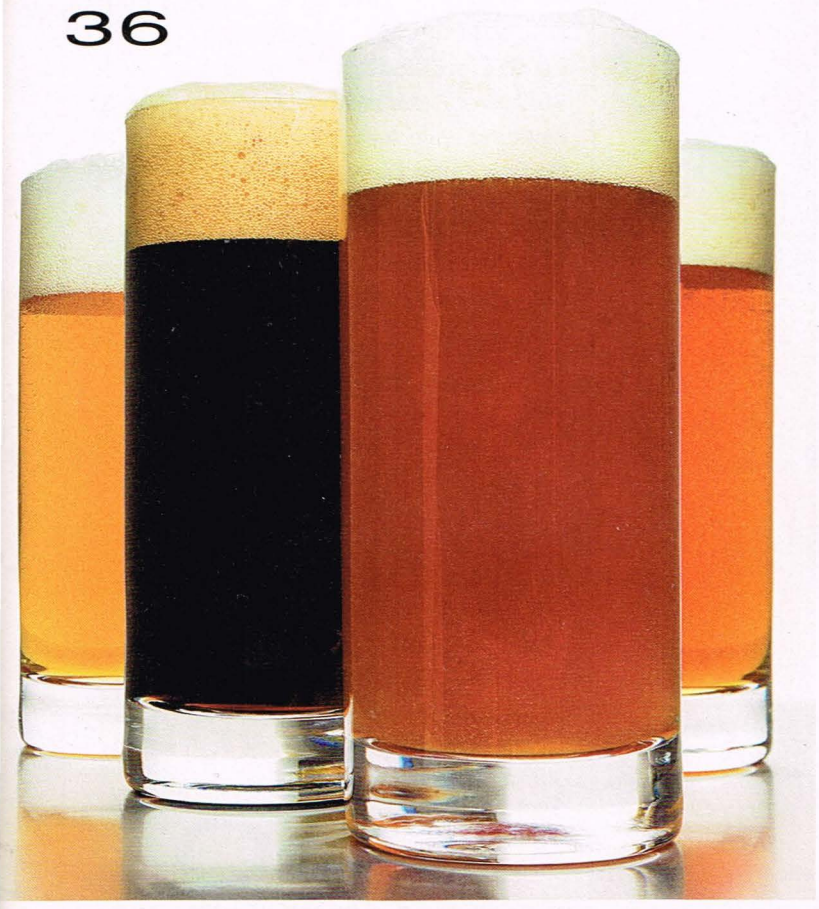

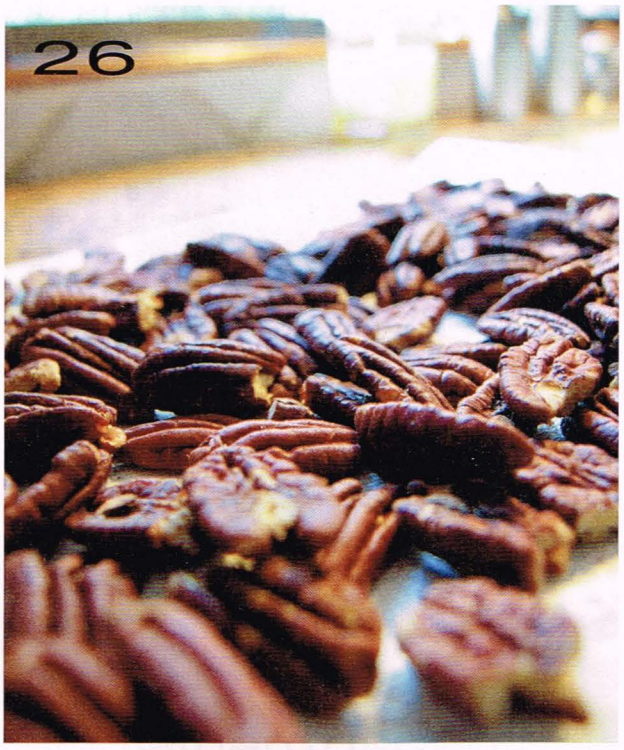

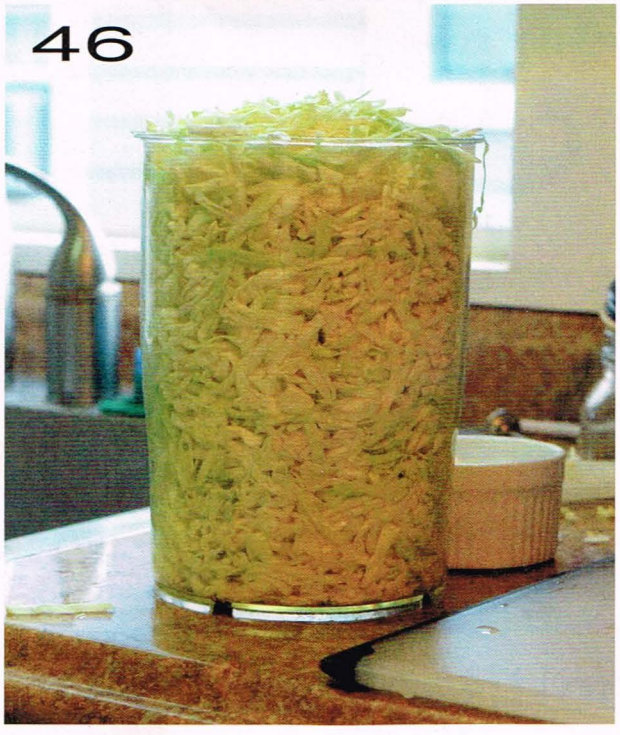

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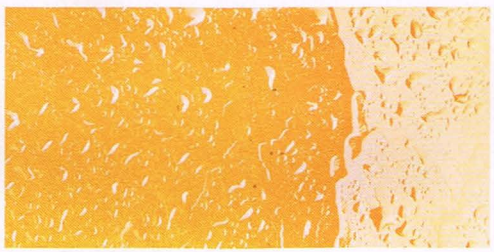

BYO RECIPE STANDARDIZATION

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

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

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

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

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what's happening at BYO.COM

IPA basics

Variations on IPA, like those on page 36 of this issue, are making a lot of inroads in brewing circles. But to truly brew a great IPA variation you have to know the basics of the original style. Learn more - or refresh your memory - about the origins of (and rules for brewing) India pale ale.

www.byo.com/component/resource/article/1555

Think like a beer judge

So you think you know your beer styles

- but are you ready to become a beer judge? The Beer Judge Certification Program (BJCP) has developed detailed guidelines describing the world's major beer styles, and quite a few minor ones. If you want to evaluate like a beer judge, check out how a judge approaches and scores each entry on competition day.

www.byo.com/component/resource/article/756

Make mozzarella

You may notice that your homebrew shop also stocks supplies for making cheese — why not give it a try? Making homemade cheese is not only easy, it's tasty! Check out the steps and a recipe for making your own mozzarella at home

www.byo.com/component/resource/article/2027

Cover Photo: **Charles A. Parker**

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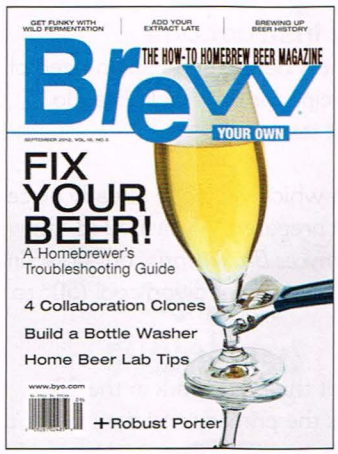
Volume 18, Number 6: October 2012



Wrestling with a recipe

Yesterday, I tried for the first time one of your recipes from *250 Classic Clone Recipes*: The Deschutes Black Butte Porter. As I progressed on brew day, I found that it called for a total of two pounds of grain yet only three quarts of water for thirty minutes. Needless to say this turned out to not enough to even cover the grain in my steeping bag in my five-gallon kettle. I did find that by tipping the kettle a bit I got all the grain under liquid. Not much fun. Was this amount correct? I did not want to deviate from the recipe (add more water) if this was what needed to be done to get the flavor where it should be. The OG as listed is 1.053 mine ended up 1.048.

Steve
via email

Three quarts (2.8 L) of water added to 2.0 lbs. (0.91 kg) of grains is a liquor-to-grist ratio of 1.5 qts./lb. (3.1 L/kg). This is a fairly thin mix. (For reference, many all-grain brewers favor a 1.25 qt./lb. (2.6 L/kg) mash thickness. Most modern malt extract based recipes in BYO *call for steeping grains in the 1.38–1.50 qt./lb. (2.9–3.1 L/kg) range.) You should have had no problems submerging all of the grain.*

There are a couple possibilities of what went wrong. The first is that one of your measurements — either the volume of the water or the weight of the grain — was incorrect. There is, however, a more likely problem.

You note that when you tipped your vessel, the grain bag was completely submerged. This suggests that your brewing kettle (in which you were steeping the grains) is short and squat, as compared to tall and thin. Although the ratio of water to crushed grains was fine, the geometry of your vessel caused problems.

Tipping the brewpot was a good "on the fly" correction during your brew day. A more permanent solution would be to steep small amounts of grain in a fairly large kitchen pot instead of your brewpot. These days, most malt extract based BYO *recipes call for steeping 2.0 lbs. (0.91 kg) of grain (the specialty malts and whatever amount of the appropriate base malt to get to 2.0 lbs. (0.91 kg), so any*

Christian Lavender is an Austin, Texas area homebrewer who runs kegerators.com, a site devoted to finding the best prices on kegerators. You can also ask kegerator-related questions on the site and he will answer them.

In the November 2011 issue of *BYO*, he described how to build a homebrew bar with everything a homebrewer would want. In addition, he has contributed several installments of our "Projects" column in the past couple of years.

In this issue, Lavender wrote an article on building temperature probes and automated mash temperature control (on page 73) and also a feature article on brewing with nuts and seeds (on page 26).

Gordon Strong is the President of the Beer Judge Certification Program (BJCP), the organization that certifies beer judges for homebrew competitions and also registers qualifying homebrew competitions. As a three-time winner of the Ninkasi award, he knows plenty about entering homebrew contests. And, as a Grand Master Level V judge in the BJCP, he also knows about judging competitions. On page 56, Strong takes us behind the scenes at a typical homebrewing competition and reveals all the organization and effort required to pull one off. Whether you're someone who enters competitions or are thinking of organizing one with your club, you'll want to check out this article.

Gabe Jackson works at The Beverage People, a homebrew shop in Santa Rosa, California, and is a regular contributor to their newsletter. His West Coast location puts him right in the middle of the West Coast IPA boom that has been occurring for many years as breweries seek to brew ever hoppier creations for their lupulin-loving fans. But upward isn't the only way to go with IPAs, they can also hybridize with other styles and many breweries have IPA offerings that fall outside of the usual American IPA mode.

On page 36 of this issue, he discusses new hybrid IPAs and gives recipes and brewing tips for a black IPA, wheat IPA, rye IPA and a Belgian IPA.

kitchen pot around 4 qts. (4 L) would be great for this. When your steep is over, you could lift the bag out of the pot and place it in a colander over the pot, then rinse the grains with hot water until you reach just short of 4 qts. (4 L). Then, add this "grain tea" (it's really wort if base malt was included in the steep, and you followed the temperature and volume instructions carefully) to your brewpot. An added benefit of using the second pot is you can be heating water in your brewpot as the grains steep.

Achieving a 1.048 original gravity when you were expecting 1.053 isn't so bad. It's 90% of what you were shooting for. In the case of a 5.0-gallon (19-L) malt extract based recipe that only calls for 2.0 lbs. (0.91 kg) of grains, it's hard to tell if the steep was the problem or not. It could also be less concentrated malt extract than the recipe assumed or your volume could have been high.

The real question, though, is how did it taste? I think most homebrewers would view their brew day as a success if they overcame a technical challenge, ended up a bit short on their gravity, but had 5.0 gallons (19 L) of tasty beer to show for it.

Plus, if you took good notes, odds are you can get much closer to the target gravity if you tweak the recipe slightly next time; adding half a pound of dried malt extract should do the trick.

Well-Aged souring instructions

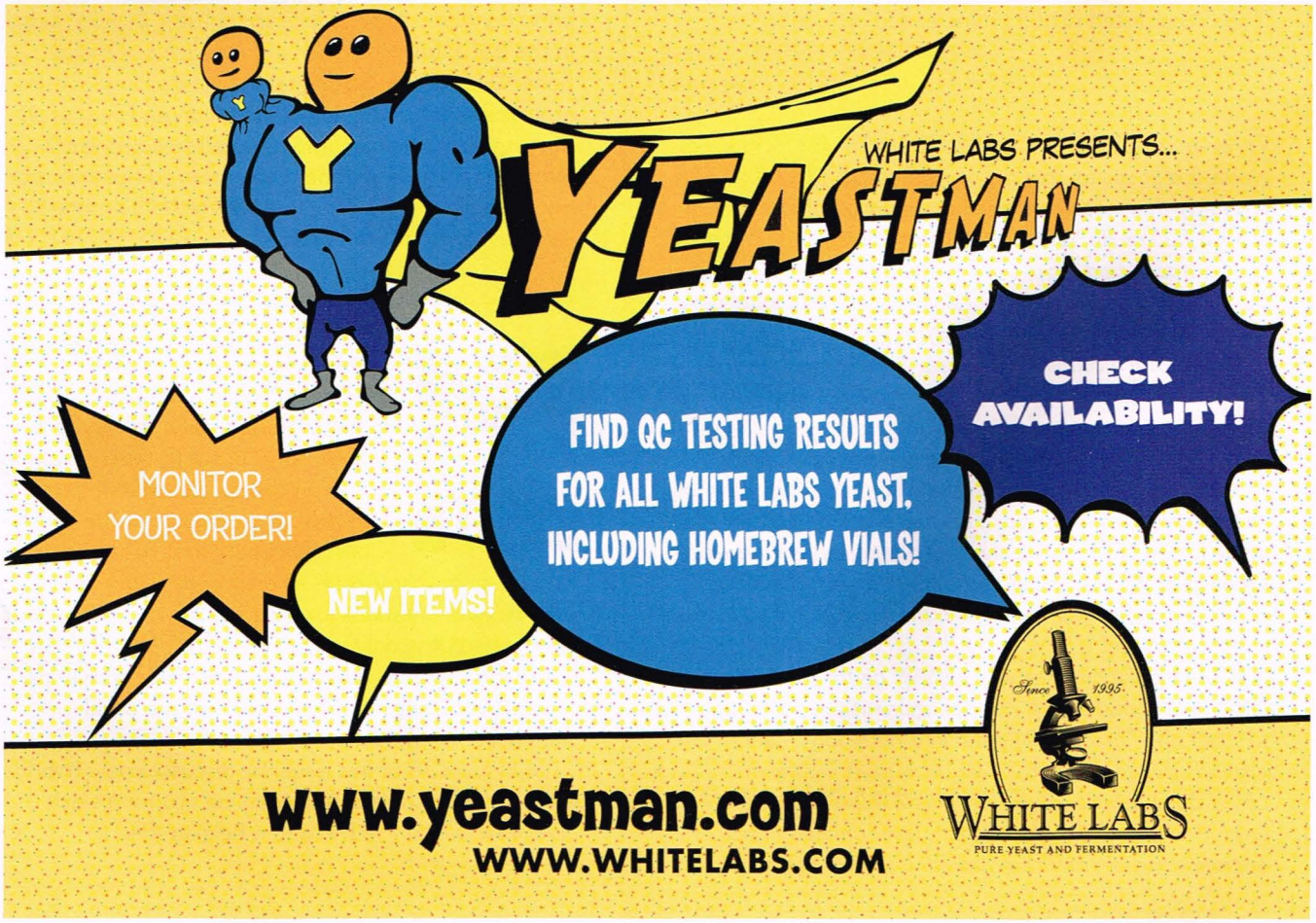
I haven't used *Brettanomyces* before and I am in need of some clarification. The recipe for the Apple Pseudo Lambic in your recipes list states to:

"Rack into a secondary in which you have already placed the chopped apples. Pitch prepared Wyeast 3278 (formerly labeled as *Brettanomyces Bruxellensis*, but now simply called B-yeast), close up, and condition cool (50° to 55° F) for 10 to 15 days."

My question is, do I let the *Brett* work in the 70–75 °F (21–24 °C) range as the primary and then lower to the 50–55 °F (10–13 °C) or pitch the *Brett* and lower the temperature right away?

John Ford
via email

This recipe, from our website, dates back to the September 2006 issue. Homebrewers have gotten more sophisticated about brewing sour beers since then. Brett *will work at the lower temperatures, only slower. We would recommend an intermediate temperature of 60–65 °F (16–18 °C) knowing what we know now. Also, make a BIG yeast starter and expect the fermentation to proceed somewhat slowly.* BYO



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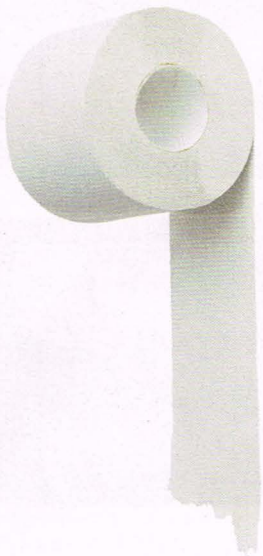

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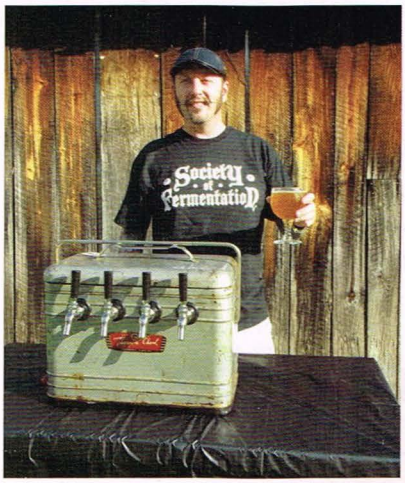

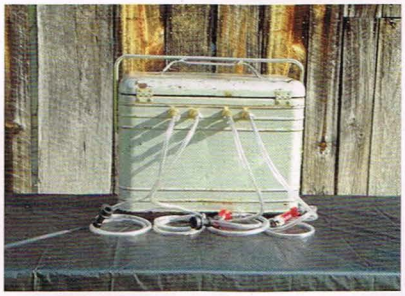

Jon Brooks • Kingsport, Tennessee

Over the last ten years I have become more serious about homebrewing and in the last four years, I have really stepped up my game. During this time, I have met some incredibly talented brewers and equipment builders and have started looking at the hobby and industry a little differently. My background is in graphic design and I have been active in printing and print production for nearly 20 years. All that said, I feel the overall look of a product is what will grab a customer's attention first. Looks matter. As well, the product should be able to sell itself.

Myself (aka Tattood Brew), Jay Davis ("Jay's All-Electric Setup" in the Jan-Feb 2011 issue of *BYO*) and Ernie Dunn, were not having the best of luck with a long-running homebrew club in the area, so we decided to start our own club in January 2012, which we named the Society of Fermentation. We now have nine members and made our first festival appearance at the Thirsty Orange Brew Extravaganza in Johnson City, Tennessee in April 2012. We brought 25 beers to serve including two meads. The club brought home three medals for that festival — more than any of the other homebrew clubs that were there.

To get ready for this festival I told Jay that I wanted to build an awesome showpiece tap box and not just the blue or red plastic cooler that everyone else has. I started shopping for old metal coolers around January and finally found one that was affordable and also had the age I desired for the piece. Jay shared some great suggestions as to how to set the box up with quick connects so that everything could easily be disconnected and put into the cooler for easy storage. I decided on Perlick Faucet - Perl 525 stainless steel faucets, a new 4-out cold plate and a 6-way manifold for my CO_2 distribution to allow myself some choices at an event.

The best compliments at the festival were from pro brewers bypassing the beer to get a look at my tap box. I do want to give a huge congratulations to the Society of Fermentation for a festival well done and an additional thank you to Jay Davis for the help with this great box. I will be building more, which I intend to sell in the near future. If anyone is interested you can contact me at Jon@tattoodbrew.com. Please come by and check me out at http://tattoodbrew.com/ and follow me on Twitter @tattoodbrew.

byo.com brew polls

What is your favorite type of new-fangled IPA?

Black IPA 32%
Rye IPA 29%
Belgian IPA 16%
Red IPA 13%
White/Wheat IPA 10%

we WANT you

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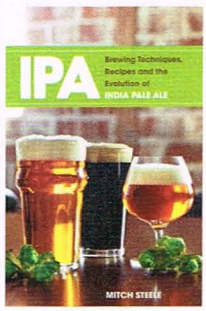
what's new?

GrogTag.com Customizable Beer Labels

Create customized, reusable beer & wine labels online. GrogTag.com is an easy-to-use, professional grade, short run beer label creation system that gives homebrewers a way to label their beers without having to make a trip to the local office supply store. Features more than 50 professionally designed label templates and the ability to upload your own artwork. Labels are water resistant, reusable and Write-on-able, Wipe-off-able.

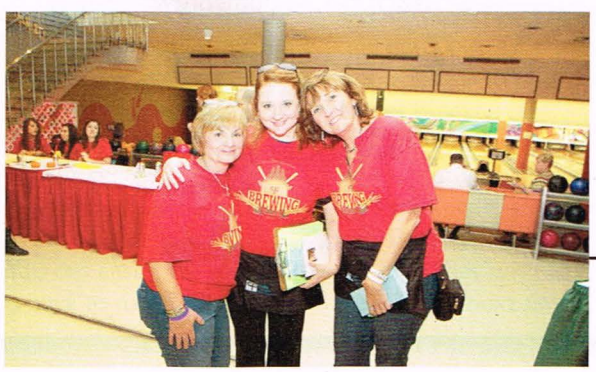
GrogTag.com

IPA: Brewing Techniques, Recipes and the Evolution of India Pale Ale



Stone Brewing Co.'s Brewmaster Mitch Steele presents the authoritative guide to the brewing techniques and history behind India pale ale. IPA covers the real history of IPA as well as techniques ranging from water treatment to hopping procedures, including 48 recipes ranging from historical brews to recipes for the most popular contemporary IPAs made by craft brewers such as Deschutes Brewery, Dogfish Head Craft Brewery, Firestone Walker Brewing Company, Pizza Port Brewing and Russian River Brewing Company.

$24.95 at major booksellers



calendar

October 5
Roberts Cove Germanfest Home Brew Competition
Crowley, Louisiana

The Roberts Cove Germanfest Association is hosting a new AHA-sanctioned homebrew competition to be held in conjunction with the 18th Annual Germanfest festival. Only German-style beers will be considered for the top three awards.

Entry fee: $8 for 1st entry/ $5.00 for each additional entry
Deadline: September 28
Contact Email: David Hebert, david.hebert@us.army.mil
Web: www.robertscovegermanfest.com/

October 13
Brewing Up A Cure
Pittsburgh, Pennsylvania

Three Rivers Underground Brewers will hold the Sixth Annual Brewing Up A Cure to benefit the Cystic Fibrosis Foundation of Western Pennsylvania at the PPG Wintergarden in downtown Pittsburgh. The event features a variety of homebrewed beers made by the members of Three Rivers Underground Brewers. Also enjoy great cuisine from various Pittsburgh restaurants, live entertainment, raffles, a silent auction and basket auction.

Tickets: $40 in advance, $50 at the door
Contact: Mont A. Handley, mont.handley@visitpittsburgh.com
Web: www.brewingupacure.org

October 27
Figueroa Mountain Brewing and Valley Brewers Pro-Am Competition
Buellton, California

Buellton's River View Park will play host to the city's first Brüegala, a celebration of German beer and foods, on Oct. 27. The event will also feature a Pro-Am homebrew competition by Figueroa Mountain Brewing Company. Tickets for the Brüegala are $25 Advance/$35 At the door.

Entry Fee: $6 first entry/$4 additional entries
Deadline: October 20
Contact: A. J. Stoll, AJ@figmtnbrew.com
Web: http://bruegalabuellton.com/

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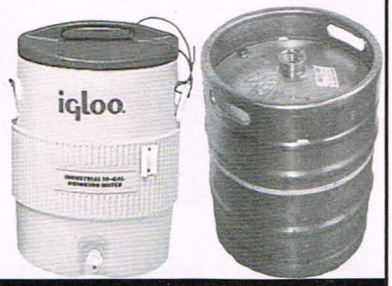
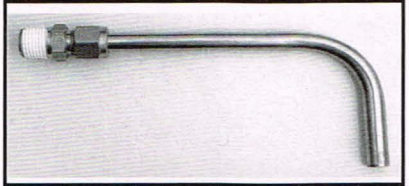
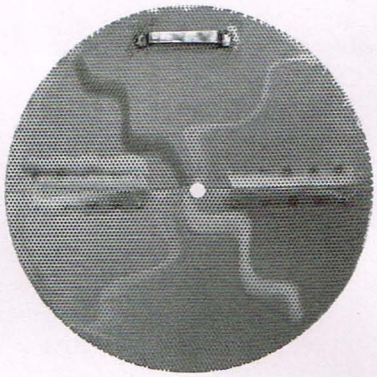
BREWING SOLUTIONS



Keg & Cooler Conversion Kits



Dip Tubes



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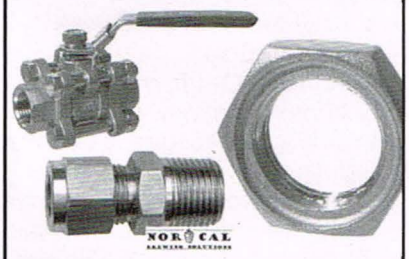

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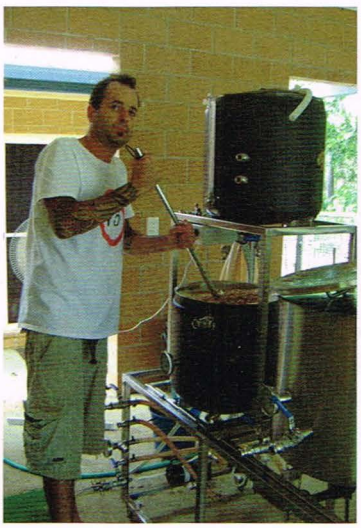

This is my brewing set up in Queensland, Australia. I have a 50-liter (13-gal.) hot liquor tank (HLT), 35-liter (9-gal.) mash tun and a 75-liter (20-L) kettle. It has a plate cooler and also a copper coil built in to the mash tun for extra cooling needs. A genius called Wayne from Beerbelly Brewing in Adelaide built it for me.

I have a 50-liter (13-gal.) conical fermenter in an adjacent fridge, and then the beer goes into kegs. I'm told I make some fantastic beer. IPA, cream ale and an Irish red have been my favorites lately.

social homebrews

homebrew haiku contest

Brew Your Own asked our Facebook fans and Twitter followers to share their best homebrew-themed haikus. Here are our top three choices, as judged by our poet-in-residence, Kiev Rattee. Thank you to everyone who entered!

Winner: Michael Florez
Wooden paddle stirs
Cool and quiet weeks pass by
Barley turns to gold

Second Place: Meadvangelist
Mead is nectar fuel
For flying like the bees do
Into the heavens

Third Place: Jason Castonguay
Pour a man a beer
He drinks for but a moment
Teach him to homebrew

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YOUR FIRST COMPETITION

by betsy parks

In this issue on page 56, Beer Judge Certification Program (BJCP) President Gordon Strong takes readers behind the scenes of beer competitions. Competitions can be a fun way to learn more about brewing better homebrews — and maybe earn some bragging rights as well. If you are interested in seeing how your homebrews stack up in competition, be sure that you and your beer are as ready as possible to compete before you send in your first entry.

Why enter?

There are two reasons to enter your beer in a competition. The first is that you believe you have made a great beer and you would like to see if trained, impartial judges agree. Your friends and homebrew club buddies might say your beer is pretty good, but to really get an unbiased assessment you need an outside opinion. The second is to get some objective feedback about a beer from people who know about beer beyond your normal circle of friends and fellow homebrewers. You may have brewed something that you know is somehow flawed, but you're not sure why. Or you may have brewed a beer that is ok, but you'd like some feedback on how it could be better. Tasting notes from competitions can shed some light on what is going wrong in your beer that you might not detect yourself.

Be ready

Before you enter any homebrew competition, do some research on the actual event. Find out as much information about the rules, categories and regulations as you can, and be sure to double check the deadline. It is a good idea to plan at least a few months ahead to enter a competition in order to be totally prepared. You can easily make mistakes if you have to rush.

If you are sure that your beer is ready for competition, make sure that it is labeled properly according to the competition's rules. Many great beers are disqualified from competitions because of improper labeling. Also, be sure to enter your beer in the category that you think it will be best represented by visiting the BJCP style guidelines at http://www.bjcp.org/stylecenter.php. (The BJCP also has many applications for checking from your mobile device.) For instance, if you have brewed a porter, be sure you enter it as either a brown, robust or Baltic porter.

Pack and ship

Be sure to pack your bottles of homebrew carefully before sending it off to be judged. This is true whether or not you are shipping or dropping it off at a location yourself as there is no way of controlling how your bottles will be handled in the lead up to judging day. Your beer may be a best of show, but it won't matter if the bottle breaks before it gets to the judging table. Pack your bottles well with Styrofoam or bubble wrap and it is a good idea to mark the boxes as "fragile."

Reading the scoresheet

When you receive the judging results, take in the information and interpret it in a way that will be helpful to your future homebrews. Often homebrewers read their scoresheets the wrong way — either by reading too much or too little into it. Don't overreact to a low score, and don't overestimate a high score. Some judges tend to score lower or higher than average, so if you want to know how your beer really fares, enter it into multiple competitions and see how it is rated on an average. Pay attention to any judging notes as they will help you brew that beer better next time.

by marc martin

DEAR REPLICATOR, I WENT TO A BEER TASTING AT BRUISIN' ALES IN ASHEVILLE, NORTH CAROLINA, WHICH FEATURED BEERS FROM THE ABITA BREWING COMPANY. I WAS IMPRESSED WITH THEIR ANDYGATOR DOPPELBOCK. THEIR WEBSITE SAYS THAT THEY USE GERMAN LAGER YEAST AND PERLE HOPS. IS THERE ANY CHANCE YOU COULD HELP ME WITH THE REST OF THE RECIPE?

TOM ATHOS
ASHEVILLE, NORTH CAROLINA

Abita President David Blossman began homebrewing in high school and continued in college. He even wrote some of his college papers on the feasibility of operating a craft brewery. The town of Abita Springs in Louisiana had a history of being famous for its pure, artesian well water. With great water, a small building and a 15 barrel brewing system the story of the Abita Brewing Company began. They have grown from a production level of only 1,500 barrels that first year (1986) to the 15th largest ranked brewery in the US in 2010.

Brewmaster Mark Wilson shared the details of Andygator with me. A homebrewer himself, he started at Abita in 1995 as a brewery assistant. In 2003 he completed the World Brewing Academy diploma course and became Brewmaster in 2004.

Andygator started out as a homebrew recipe which was entered in a contest they sponsored in 1994. Andy Thomas was the winner that year with this recipe, hence the name "Andygator."

Abita started brewing Andygator year-round in 1999, and in 2009 started bottling it in 22-oz. packaging to make it more widely available. They consider this beer to be more of a helles style as the color and flavor levels are similar to a stronger helles bock. He recommends using a very soft water.

Andygator pours a perfectly clear, pale gold color, topped by a lacy white head that sticks to the glass as it dissipates. While the beer boasts a fairly sweet aroma, it veers from more traditional examples with a modest hop scent that blends with the slightly toasted grains. Flavors are well-organized, beginning sweet with toasted barley and a vanilla-like caramel sweetness followed by a balanced floral hop flavor and bitterness. This is a big beer to be sure, and its body displays that in its fullness, but the finish is sweet and sticky.

Tom, Andygator will now be on tap at your house because you can "Brew Your Own." For further information about the Abita Brewing Company and their other fine beers visit the website www.abita.com or call the brewery at 800-737-2311. BYO

ABITA BREWING COMPANY ANDYGATOR DOPPELBOCK CLONE

(5 gallons/19 L, extract with grains)

OG = 1.078 FG = 1.017 IBU = 25 SRM = 8 ABV = 8%

Ingredients

6.6 lbs. (3 kg) Briess Pilsner unhopped liquid malt extract
2.0 lbs. (0.9 kg) dried malt extract
3.0 lb. (1.36 kg) Pilsner malt
6.2 AAU Perle hop pellets (60 min.) (0.75 oz./21.3 g of 8.25 % alpha acids)
2.1 AAU Perle hop pellets (30 min.) (0.25 oz./7.1 g of 8.25 % alpha acids)
4.1 AAU Perle hop pellets (5 min.) (0.5 oz./14.2 g of 8.25 % alpha acids)
½ Tsp. yeast nutrient (last 15 min.)
½ Tsp. Irish moss (last 30 min.)
White Labs WLP 830 (German Lager) or Wyeast 2308 (Munich Lager) yeast
0.75 cup (150g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 154 °F (67.8 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add the liquid and dried malt extracts and boil for 60 minutes. While boiling, add the hops, Irish moss and yeast nutrient as per the schedule. Now add the wort to 2 gallons (7.6 L) of cold water in the sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool over the next few hours to 65 °F (19 °C). When evidence of fermentation is apparent drop the temperature to 52 °F (11 °C). Hold at that temperature until fermentation is complete (approx. 10 days). Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Condition for 2 weeks at 42 °F (5° C) and then bottle or keg. Allow to carbonate and age for four weeks and enjoy your Andygator Doppelbock clone.

Note: For tips on cooling your fermentation refer to the July/August 2006 issue of *Brew Your Own*. For more about brewing doppelbock, turn to page 19 of this issue.

All-grain option:

This is a single step infusion mash using an additional 13 lbs. (5.9 kg) Pilsner malt to replace the liquid and dried malt extracts. Mix the crushed grains with 5.2 gallons (19.7 L) of 174 °F (0 °C) water to stabilize at 154 °F (67.8 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6 gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the 60-minute hop addition to 0.6 oz. (17 g) of Perle hop pellets (5.0 AAU) to allow for the higher utilization factor of a full wort boil. The remainder of this recipe and procedures are the same as the extract with grains recipe.

Tasting Notes

Competition advice from beer judges

by Betsy Parks

HOMEBREW COMPETITIONS TAKE A LITTLE BIT OF LUCK AND A LOT OF PRACTICE TO WIN. THIS ISSUE, GET SOME EXPERT ADVICE FROM THREE BEER JUDGE CERTIFICATION PROGRAM-CERTIFIED JUDGES TO HELP YOU BREW YOUR BEST AT THE NEXT CONTEST.

One mistake I notice when I'm judging is mislabeled or miscategorized entries. In fact I would say that that there are usually one or two per flight. Some of them are minor — like a porter in a stout flight — but some are pretty far off the mark. A lot of beginning brewers will enter a beer and think it's pretty good but are not sure what style category it belongs in. A good judge will note that in the tasting notes.

As for common flaws in beer tasting, things I notice most often are phenolics from wild yeast, ester profiles from fermentation and high amounts of esters from poor aeration or poor temperature control.

If you are entering competitions to brew better beers, pay attention to judges' feedback. For example, if there is a consistent flaw in your beer each of the judges will pick up on it.

If you are entering to win, there are a couple of schools of thought on how to do that. You could find a competition or style that's not heavily entered, or enter categories with not many entries. I think if a brewer is competent at brewing a particular style, however, I would try to enter competitions where you know that those particular judges know about that style. Before you enter a competition, know who the judges and the organizer are. Research what styles they know. It's discouraging to brew a good beer and have it tasted by judges who don't know the style.

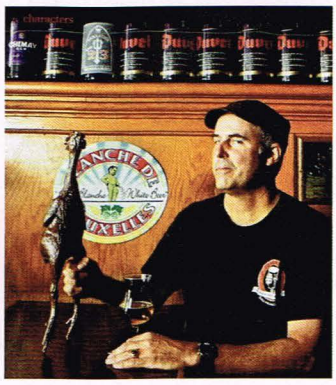
Also, enter your local competitions. If your local competition is small, you can use that feedback to enter beers into larger, more prestigious events.

Scott Bickham, Beer Judge Certification Program (BJCP) Grand Master III judge, BJCP Exam Director and Northeast Representative from Corning, New York. Scott was responsible for the creation of an online entrance exam system for BJCP that was launched in 2012.

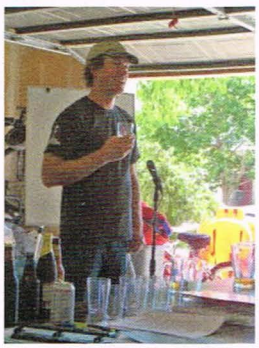
I notice that brewers can rush when getting ready to enter a contest. Very rarely is waiting an extra week going to make a beer too old, but it can definitely be one week too early when they are rushed. Give your beer time to finish. Once it's in the bottle and away from the yeast it's not going to finish in the bottle and what the judges taste will be under attenuated, too sweet or too malty.

Another contest skill is packaging. I've noticed in my time judging that the hardest skill for people to learn in this hobby is to take beer from your house and get it to the contest in the same shape. They haven't really thought about what happens after the beer leaves his or her hands. It could be turned upside down 15 times in shipping and holding, experience temperature changes, and so on. One way to mirror what happens to your beer is to treat a bottle of it as it might be treated after you ship it. Try taking a bottle out of fridge for two weeks and letting it sit at room temperature and then tasting it.

Also, do your best to clear the beer. There are some styles that benefit from being on yeast, but if it's being shipped, which can mean warehousing and temperature changes, that yeast can turn on you in a heartbeat. I'm not a big believer in filtering in homebrew as there too many chances to oxidize, but I sometimes use gelatin, and I always cold condition it to get as much of the yeast out of suspension as possible. Take the clearest beer off the top when you transfer between vessels and use CO_2 to purge your kegs or bottles when transferring to prevent oxidation. I use a lot of CO_2 in my homebrewery.



Phil Farrell, Grand Master Level II judge and the South Regional Director for the BJCP from Alpharetta, Georgia. Phil was the Beerdrinker of the Year in 2011 and has judged beer on three different continents.



David Teckam is the West Representative for BJCP and a Grand Master beer judge from Elk Grove, California. David is also a respected beer educator. His website, www.beerjudgeschool.com is an online guide for passing the BJCP exam and becoming a better beer judge.

In my years judging I have noticed that often brewers don't know quite how to enter the beer in terms of styles, or they don't provide enough information for the judges to give the beer a proper evaluation. For example, at one competition the entrants did not provide some of the most important information we needed for judging meads, such as the sweetness level, carbonation, etc. It makes me think that people are not looking up the style details they need.

I do find common faults, such as high diacetyl, or also oxidation in the form of poor handling (which can be the fault of the entrant or even the organizer handling the beer). But more often I see stylistic inaccuracies — usually made when a brewer is brewing something for the second or third time and trying to dial it in.

If you want to do well in a competition, going for more obscure styles makes sense. IPAs are a dime a dozen. That doesn't mean that they aren't popular with the judges, but we also don't want to blow our palates on hops either. Try brewing something like a Schwarzbier or a bière de garde — although you do have to know the style, however.

Each competition you enter depends on the quality of the judges and you adhering to the style guidelines. Even then it is still kind of a gamble — you could have a great beer that could get by a judge, or you could have entered the one bad bottle in a batch. There are a lot of competitions that are free to enter — if you have a few bottles from a batch, enter it in more than one competition. You might be surprised at the feedback you get from judge to judge. It'll make you wonder if they're drinking the same beer. And, if the judge puts their contact info on the score sheet, don't be afraid to contact them. They usually don't mind giving extra help. BYO

Hop Growing

Blow-off blues, beer styles

by Ashton Lewis

Q I AM GROWING MULTIPLE VARIETIES OF HOPS AT MY HOME IN SOUTHERN NEW JERSEY. HOW DO I USE THEM, WET OR DRY? AND WILL THEY HAVE THE SAME PROFILE AS COMMERCIALLY GROWN VARIETIES?

GERALD FEIGIN
WASHINGTON TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY

A The history of hop growing is replete with stories of disease and pests. Indeed, New York State was a prolific hop growing region in the US during the 19th century and into the early 20th century, producing about 90% of the US hop crop. Molds, aphids and Prohibition created the perfect storm and hop growing in this part of the country all but vanished. Today the majority of the US hop crop is concentrated in Washington, Idaho and Oregon.

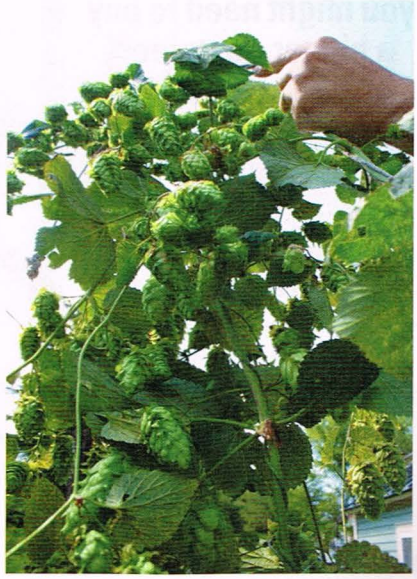
The bottom line with hop growing is that you must have healthy plants to produce hop cones that we want to use in the brewery. During a recent visit to Oregon, I saw that the emphasis for most hop growers was related to developing varieties that are resistant to powdery and downy mildews and controlling hop aphids. Climate is a big factor in influencing the growth and spread of these problems. The good news is that you live in the "hop belt" extending from about 35–50 degrees latitude, although most of the world's hop crop is grown in latitudes greater than 40 degrees.

OK, so what does it mean to have hops with commercially grown qualities? For starters, commercially grown hops are normally kilned and packaged into compressed bales. Baled hops have much better storage properties than loose hops, and without good storage properties commercially processed hops are not much use to brewers. Baled hops are often pelletized after harvest, and this is accomplished by milling the hops and compressing them into hop pellets.

Homegrown hops are very unlikely to be baled or pelletized unless you happen to live next door to a hop processor. Many homegrown hops are used "wet" right after harvest to brew beers with the wonderful aroma of fresh hops. If your hops are healthy then you should be able to produce beers with wet hops that are really not too different from commercially grown hops.

If you want to store your homegrown hops then you must remove the moisture. This is not that difficult to do. Commercial hop growers use hop kilns, which consist of a holding box with an open bottom permitting the flow of warm, dry air into the kiln. While air temperature for kilning varies, a typical kiln operates at about 120 °F (49 °C), with total drying times of about six hours. After kilning the hops are allowed to rest for about 12 to 24 hours before compressing into bales. At home, you can dry a small crop of hops on clean window screens in a dry, warm area of your home — such as an attic or loft for two or three days. Be careful not to over dry the hops to the point where they shatter when you open up the cone or to the point that they turn brown. When they are dry you can store them in an airtight container in your refrigerator or freezer. A good option for the home hop grower is the use of a vacuum bagging system to help preserve hops for storage and future use.

"The bottom line with hop growing is that you must have healthy plants to produce hop cones that we want to use in the brewery."



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help me mr. wizard

Q WHEN COLD CRASHING, HOW DO YOU PREVENT THE AIRLOCK/BLOW OFF LIQUID FROM GOING INTO YOUR BEER?

@DUBYASBREWING
(VIA TWITTER)

A You asked me "how I prevent" suck-back from occurring during cooling of the fermenter. In our operation at Springfield Brewing Company we use blow-off buckets for airlocks and the vertical distance from the top of the tank to the airlock down at the floor level is too high for suck-back to occur, even if the tank were under full vacuum, or roughly 29 inches (74 cm) of water column. Suck-back is a real problem in carboys equipped with airlocks and happens when the gas in the headspace of the fermenter is cooled. When this happens the volume of the gas is reduced, thus creating a vacuum.

In our brewery we usually build up pressure in our fermenters before fermentation ends by capping the fermenter with a special type of pressure relief valve called a spunding or bunging valve. If the tank has not been spunded, we increase the head pressure with carbon dioxide gas before cooling because vacuum in stainless steel tanks can cause problems if for whatever reason the vacuum relief valve fails to operate properly. For this reason most commercial brewers are very careful about avoiding vacuum situations.

Pressurizing a carboy is not something that should be considered, unless you are day-dreaming about things NOT to do in the homebrewery, since they are not rated for pressure. The method that I prefer using when fermenting in a carboy is to remove the airlock before cooling and to replace it with a clean cotton wad. The best type of cotton to use comes in rolls and can be purchased at medical supply stores. The cotton batting acts as a filter as air flows through it and into the carboy during cooling. Once the beer is cool you can replace the airlock.

There are some brewers who are really paranoid about methods like this that seem crude. I have never thought anything crude about this method because of the common use of cotton plugs in microbiology classes I took while in school. It's also a bit comforting to see test-tubes with cotton plugs shown in historical pictures taken of the labs of famous microbiologists, like Pasteur. Any method that has worked for nearly 150 years is OK in my book. But if you are not sold on this method, you can also avoid suck-back by racking your beer into a keg, applying head pressure and then cooling.

Q WHAT STYLES OF BEER (IF ANY) AREN'T SUITED WELL TO HOMEBREWING AND WHY?

@EG_ACEFISCHER1
(VIA TWITTER)

A Sometimes it is nice to be able to answer a question and feel like I am telling people what they want to hear, or in this case want to brew. I am writing this answer from the warm, slightly muggy lobby of a quaint hotel waiting for the boarding bell to ring on the live aboard dive boat that will carry us to wonderful Bahamian waters. In preparation for this trip I enjoyed several local Bahamian beers last night; two

Kaliks and one Sands. These beers are what I consider typical of the types of beers that are popular in the islands in and near the Caribbean. In other words, pale in color, light in flavor and clean and delicate. These styles go very well with the hot and humid weather of the region. These types of beers are almost always fermented with lager yeast strains and are really quite good at showing their flaws.

If I were to pick a general type of beer that is not well-suited to homebrewing I would pick this general category. The category includes other popular types of beer, such as American-style lager, light American-style lager, "dry lagers", etc. In other words the type of beers a lot of homebrewers actually don't brew. The reasons for my suggestion are as follows:

Properly brewing these styles requires cool, temperature-controlled fermentation temperatures. In my experience the better the temperature control, the better the final results of the beer. I know that there are plenty of advanced homebrewers out there with fancy temperature control rigs, but for the average homebrewer the opposite is usually true.

These beer styles usually use adjuncts. While really nice all-malt beer styles fall into similar style categories, the styles I am calling out contain adjuncts for very specific reasons, the primary being that adjuncts lighten the flavor intensity and body to fit the objectives of the brewer. Many, if not most, homebrewers are not really huge fans of adjuncts. My thought here is that if you really don't like something then why try to reproduce it at home.

These beer styles are like wearing an all-white outfit to a crab feast; chances are very high that your outfit will not stay all-white for long. While it is popular to mock the seeming absence of flavor in some beers, it is actually quite difficult to successfully and consistently brew these styles at home. Indeed, these beers are a real challenge for many craft brewers to consistently brew because small differences between batches are so easily spotted. And if you are unlucky enough to end up with a defect in your beer, there is very little to hide behind.

I honestly believe that there are almost no styles that are not well-suited for homebrewing if you have the proper equipment, understand the style being brewed and are committed to taking the time to allow your homebrew to properly ferment and age. The fact is that most styles we enjoy today began in a small brewery with equipment not much different than what many homebrewers own.

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A NOTE FROM MR. WIZARD: OVER THE YEARS I HAVE BEEN ASKED MANY QUESTIONS ABOUT WHY HOPPY BEERS LOSE THEIR HOPPINESS OVER TIME AND HAVE NEVER HAD A GOOD ANSWER OTHER THAN "THIS IS JUST ONE OF THOSE THINGS THAT CORRELATES WITH BEER AGE." THIS IS ADMITTEDLY A LAME ANSWER, BUT I NEVER HAD ANY SCIENCE TO BACK IT UP. BUT THANKS TO A RECENT TRIP TO THE WORLD BREWING CONGRESS I NOW I HAVE A BETTER ANSWER TO THE QUESTION AND WANT TO SHARE WHAT I RECENTLY LEARNED . . .

A I was recently at the World Brewing Congress in Portland, Oregon and I was chatting with a friend about how beer can experience hop aroma loss over time. My friend said, "You need to ask Val Peacock about aroma scalping associated with crown liners." So I quickly found my way to where Dr. Val Peacock, former hop guru of Anheuser-Busch and one of the most recognized authorities regarding hops in the world, was hanging out. He was seated at a hop supplier's booth with his ever-present smile and easygoing demeanor on display. Craft brewers are indeed fortunate to have access to Dr. Peacock's hop knowledge now that he is independent from his former employer and working with the Hop Quality Group, which is based in Santa Rosa, California. (Hint to "Mr. Wizard" readers: please send me a question about the Hop Quality Group!) I asked Dr. Peacock about this topic and the answer he gave was very straightforward: the polymeric liners used in bottle crowns to help prevent oxygen ingress have a very strong affinity for aromatic hydrocarbons, just the sort of compounds associated with hoppy aromas.

The bottom line, according to Dr. Peacock, is that many of the most desirable aromas associated with hoppy brews are adsorbed by crown liners before most commercial beers ever make it into the consumer's glass, or about three weeks after bottling.

So based on that information, Val's advice for preventing hop aroma loss (at least for bottled beer) — be it commercial or homebrew — was pretty simple: If you are brewing hoppy beers and want the hop aroma to remain unchanged for longer durations than what is typically found with bottled beer, use kegs instead of bottles. BYO

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Doppelbock

An easy-drinking classic

by Jamil Zainasheff

When new homebrewers come into the hobby, it seems that they often focus on pale ale, IPA and stout. I think I was really lucky when I started homebrewing, because many of the homebrewers I met had already moved on from those common styles. That early exposure really helped my beer knowledge blossom. For example, bock beers were common around our homebrew community. I remember being particularly pleased with the bock beers of my friends Steve Christian, Roger Rehmke and Rich Dickson. They all made bock beers that were rich and flavorful, but not so heavy that you could not down a liter with ease.

Doppelbock is a smooth, rich lager beer with a big malt character. It can be either pale or dark in color, as it is a bigger version of either a bock or Maibock. All bock beers have a lot of bready and toasty malt character, but that does not mean they are overly sweet. A doppelbock should be well attenuated, but the low hopping rate results in a balance toward the sweet side. A doppelbock should always be brilliantly clear and can range from deep golden to dark brown. Any alcohol should be smooth and slightly warming, never hot or solvent-like. The fermentation character is clean. While the beer should have minimal esters, some examples will exhibit, through a combination of malts and alcohol, a fruity, grape or dark fruit character.

A great doppelbock recipe is relatively simple, but many brewers try to make it far too big or more complex than needed in an effort to increase malt character. Keep in mind that all German beers are easy-drinking and doppelbock should be no exception. The best way to achieve that great German malt character is with high quality, full-flavored base malts and excellent fermentation practices. I would never attempt to make a doppelbock without using continental Pilsner and Munich malts. You can use other base malts, but the light, grainy and bready taste of high quality Pilsner and Munich malt is right on target for this style. The bulk of the grist should be Munich malt, anywhere from 50 to 70% is good, depending on the character and color of the Munich malt you source. A portion of caramel malt is acceptable, and I like the rich malty sweetness of caramel Munich malts. You can experiment with different color levels and percentages, but approximately 10% of a mid-color (40 to 80 °L) caramel is plenty. Use a high quality continental Pilsner malt for the remainder of the grist. You should be able to make an excellent example of the style with just those three malts, but if you must, you can add other malts, such as head and body forming dextrin malts or color enhancing malts. Avoid overloading the beer with too many extra specialty malts. A common problem is making the beer too melanoidin rich in an attempt to make a beer with a lot of malt character. While you want a lot of those rich melanoidin flavors, too much can make the beer taste meaty or brothy.

Extract brewers will need to use a Munich extract or do a partial mash with Munich malt. Most Munich malt extract is a blend of Munich and Pilsner (or other pale malts) in different percentages. I would try to get an extract made with as much Munich malt as possible, but always let flavor and freshness be your guide. That said, most Munich extract blends are close enough for a decent doppelbock without any adjustment. The only supplier of 100% Munich extract I am aware of is Weyermann. If you can get 100% Munich extract, then you can blend it with a Pilsner malt or pale malt extract.

I like to avoid any work that I do not feel improves a beer, so I prefer a single infusion mash. Perhaps, histori-

Continued on page 21

DOPPELBOCK
by the numbers

OG:	1.072–1.112 (17.5–26.3 °P)
FG:	1.016–1.024 (4.1–6.1 °P)
SRM:	6–25
IBU:	16–26
ABV:	7–10%

Photo by Charles A. Parker/Images Plus

Doppelbock
(5 gallons/19 L, all-grain)

OG = 1.086 (20.6 °P)
FG = 1.020 (5.2 °P)
IBU = 24 SRM = 19 ABV = 8.7%

Ingredients

3.8 lb. (1.7 kg) Best Malz or similar continental Pilsner malt 2 °L
13.4 lb. (6.1 kg) Best Malz Munich malt 8 °L
1.8 lb. (800 g) Weyermann CaraMunich® III malt 57 °L
5.2 AAU Hallertau hops (1.3 oz./37 g at 4.0% alpha acids) (60 min.)
1 AAU Hallertau hops (0.25 oz./7 g at 4.0% alpha acids) (30 min.) (optional)
White Labs WLP833 (German Bock Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 155 °F (68 °C). Hold the mash at 155 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.066 (16.2 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methionine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl Sulfide (DMS) in the finished beer. Add the first hop addition with 60 minutes remaining in the boil. Add the second hop addition 30 minutes later. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 600 billion cells (30 million cells/mL), which is 6 packages of liquid yeast or one package of liquid yeast in a 22-liter starter. That would be a starter equal to a batch of beer, so consider making a smaller beer first and repitching the yeast from that beer into this one.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

Doppelbock
(5 gallons/19 L, extract only)

OG = 1.085 (20.4 °P)
FG = 1.020 (5.2 °P)
IBU = 24 SRM = 17 ABV = 8.6%

Ingredients

11.9 lb. (5.4 kg) Munich Blend liquid malt extract 6 °L
1.8 lb. (800 g) Weyermann CaraMunich® III malt 57 °L
5.2 AAU Hallertau hops (1.3 oz./37 g at 4.0% alpha acids) (60 min.)
1 AAU Hallertau hops (0.25 oz./7 g at 4.0% alpha acids (30 min.) (optional)
White Labs WLP833 (German Bock Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

I have used a number of Munich blend extracts to brew doppelbock. While most of them have less Munich malt in them than I prefer for this style, they will still do an admirable job of brewing bock. If you cannot get fresh liquid malt extract, use an appropriate amount of dried extract instead. Using fresh extract is very important to this style.

Add enough water to the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and the gravity is 1.072 (17.5 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the first hops. Add the second hop addition 30 minutes later. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 600 billion cells (30 million cells/mL), which is 6 packages of liquid yeast or one package of liquid yeast in a 22-liter starter. That would be a starter equal to a batch of beer, so consider making a smaller beer first and repitching the yeast from that beer into this one.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

Web extra:

Follow Jamil's blog as he mans his own commercial brewery, Heretic Brewing:

www.byo.com/blogs/blogger/Jamil

cally, a brewer would use a decoction mash when brewing most German-style beers, but I find that high quality continental malts, a single infusion mash, and excellent fermentation practices will produce beer every bit as good as the best commercial examples. It is far more important to invest time and effort in fermentation, sanitation, and post fermentation handling than on decoction. If you have ensured that all of those other aspects of your process are flawless, then decoction might be something of interest. For a single infusion mash, target a mash temperature range of 152 to 156 °F (67 to 69 °C).

At most, hop character is just a background note in doppelbock. This is a beer about rich malt character and a fine example requires no hop character. If you do like a touch of hop character, keep it subtle and use only floral or spicy type hops. I prefer German grown Hallertau hops, but other German grown hops, such as Tettnang, Perle or Tradition, work well also. These hops, when grown outside of Germany, can still work well but you should check with your supplier first if you are not sure how closely they match the German grown hops. If you cannot get any of those hops, try to select hops with that same flowery or spicy noble hop character. You do not want to use anything fruity or citrusy. Some decent substitutions are Liberty and Mt. Hood. You can also try Crystal, Ultra and Vanguard. The big picture is that you want very low hop character and just a balancing bitterness, with both complementing and integrating with the malt. The balance of bittering versus malt sweetness should be even or slightly on the sweet side. The bitterness to starting gravity ratio (IBU divided by the decimal portion of the specific gravity) ranges from 0.2 to 0.4, but I like to target around 0.3. Restrict your late hops to small additions. In general, 0.25 to 0.5 oz (7 to 14 g) in the last 20 to 30 minutes of the boil for a 5 gallon (19 L) batch is the most you should use.

You can ferment doppelbock with almost any lager yeast, though my favorites are White Labs WLP833 (German Bock Lager) and Wyeast 2206 (Bavarian Lager). You will find that different lager yeast strains will emphasize different aspects of the beer. Some will emphasize malt character, some will emphasize hop character, and some will be in-between, but all can produce an excellent bock with proper fermentation. It is important to note that the sweetness present in doppelbock is more from a relatively low hop bitterness, not from incomplete fermentation.

While this style is higher in alcohol than most lagers, the beer should never be hot or solvent-like. A gentle warming when you drink the beer is what you want. Anything more is a flaw. You will run into judges that do not understand this point and seem to think doppelbock should taste like

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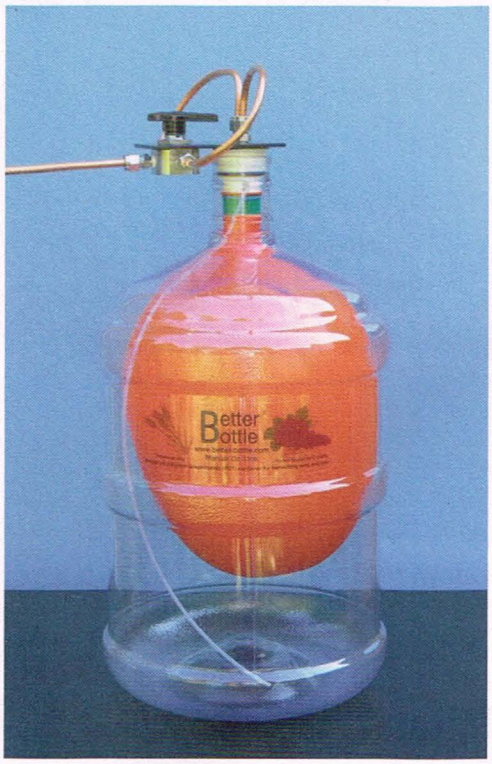

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rocket fuel. Do not fall into that trap. Instead, make efforts to try to educate those that think hot alcohols are good to drink. Proper control of fermentation temperature, a proper pitch of healthy yeast, and adequate nutrients is all it takes to avoid that hot alcohol problem.

When making lagers, I like to chill the wort down to 44 °F (7 °C), oxygenate and then pitch my yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) and then I hold this temperature for the remainder of fermentation. If fermentation seems sluggish at all after the first 24 hours, I am not afraid to raise the temperature a couple degrees more. The idea is to reduce the diacetyl precursor alpha-acetolactate, which the yeast creates during the early phase of fermentation. Once the growth phase of fer-

Doppelbock Commercial Examples

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Capital Brewery
Middleton, Wisconsin
www.capital-brewery.com

Celebrator
Brauerei Aying
Aying, Germany
www.ayinger-bier.de

Consecrator Doppelbock
Bell's Brewery
Kalamazoo, Michigan
www.bellsbeer.com

Duck-Rabbator
The Duck-Rabbit Craft Brewery
Farmville, North Carolina
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Frelser
Mikkeller
København, Denmark
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Korbinian
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Freising, Germany
www.brauerei-weihenstephan.de

Liberator Doppelbock
Thomas Hooker Ales & Lagers
Bloomfield, Connecticut
www.hookerbeer.com

Optimator
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www.spatenbraeu.de

Salvator
Paulaner Brauerei GmbH & Co.
München, Germany
www.paulaner.de

Saxonator Dunkles Doppelbock
Jack's Abby Brewing
Framingham, Massachusetts
http://jacksabbybrewing.com/

Wolfgang Doppelbock Lager
Great Divide Brewing Company
Denver, Colorado
http://greatdivide.com/

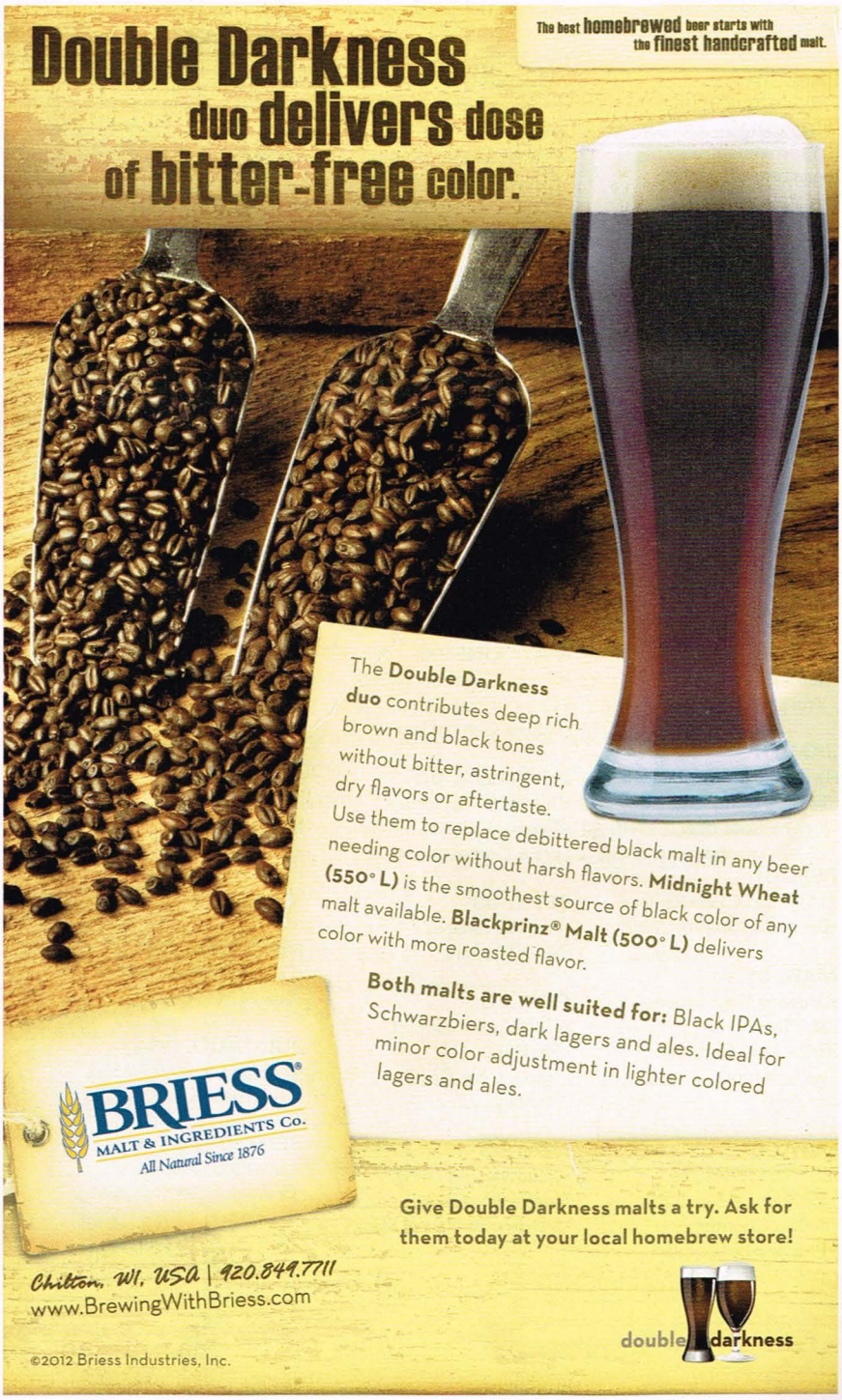
mentation is complete, it is important that fermentation be as vigorous as possible. It may never be as robust as fermentation at ale temperatures, but it is important to have enough activity to blow off aromatic sulfurs and other unpleasant compounds. Vigorous yeast activity at the end of fermentation also improves reduction of compounds such as diacetyl and acetaldehyde. Starting fermentation colder only works well if you are pitching enough clean, healthy yeast at the start. If not, you will need to start warmer (perhaps 55 °F/13 °C) to encourage more yeast growth. Even if you start fermentation warmer, you can still raise the temperature toward the latter part of fermentation.

Since diacetyl reduction is slower at colder temperatures, a cold fermented lager may require a diacetyl rest. To perform a diacetyl rest, simply raise the temperature into the 65 to 68 °F (18 to 20 °C) range for a two-day period near the end of the fermentation. While you can do a diacetyl rest after the fermentation reaches terminal gravity, a good time for a diacetyl rest is when fermentation is 2 to 5 specific gravity points (0.5–1 °P) prior to reaching terminal gravity. Brewers ask how they should know when fermentation has reached that stage. My advice is to raise the fermentation temperature for a diacetyl rest as soon as you see fermentation activity significantly slowing. It will not hurt the beer and it should help the yeast reach complete attenuation as well.

It seems that every beer style improves with some period of cold conditioning and this style is no exception. Traditional lager conditioning utilizes a slow temperature reduction before fermentation reaches terminal gravity. The purpose of the slow cooling rate is to avoid sending the yeast into dormancy. After a few days, the beer reaches a temperature close to 40 °F (4 °C) and the brewer transfers the beer into lagering tanks. If you want to use this technique, you will need precise temperature control so that fermentation slowly continues and the yeast remains active. Rapidly chilling the beer near the end of fermentation can cause yeast to excrete a greater amount of ester compounds instead of retaining them.

Personally, I prefer to wait until fermentation is complete, including any steps such as a diacetyl rest, before lowering the beer temperature. The yeast is far more active and able to reduce fermentation byproducts at higher temperatures. Once I am certain the yeast have completed every job needed, I use a period of cold storage near freezing. This time in storage allows very fine particulates to settle out and the beer flavors to mature. In any case, great lagers take time, so do not rush things. BYO

Jamil Zainasheff writes "Style Profile" in every issue of BYO. *He is the founder of Heretic Brewing Co.*



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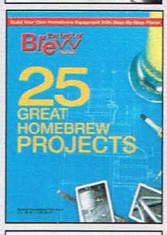

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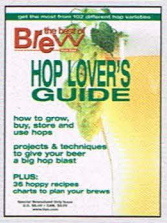

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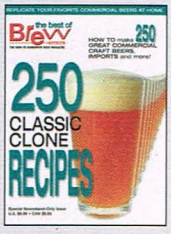

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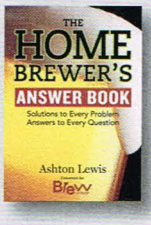

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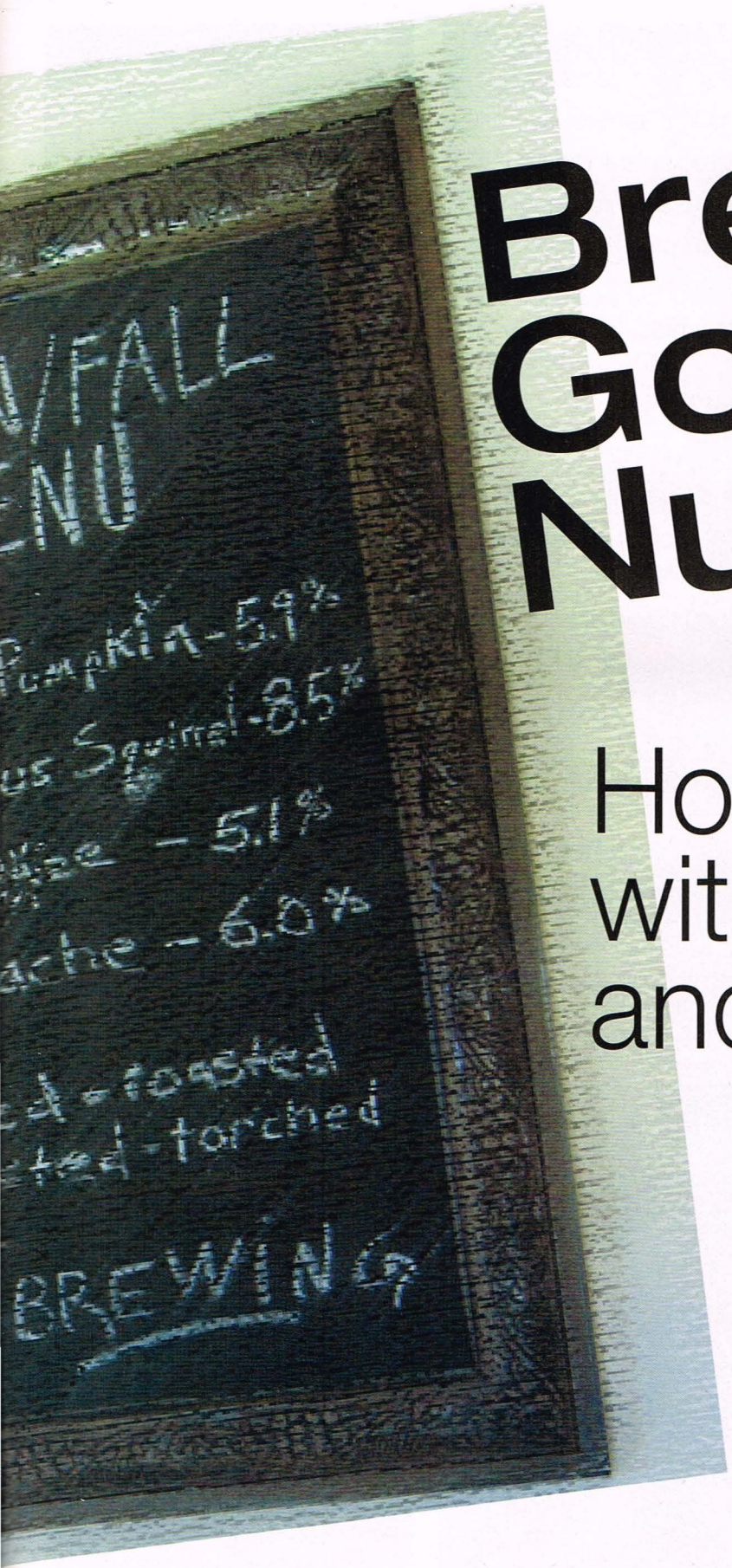
Story and Photos by **Christian Lavender**

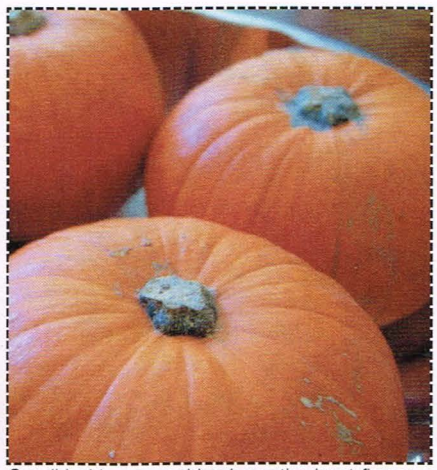


Brewing Gone Nuts

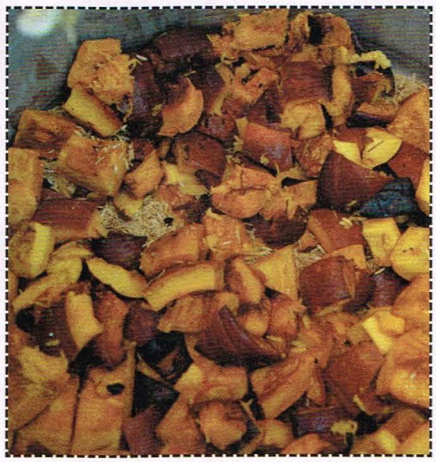
Homebrewing with Seeds and Nuts

There are always brewers that are not afraid to play with non-traditional ingredients in hopes of big flavor returns. Many homebrewers are experimenting with ingredients I rarely see in commercial beers and having great success. This freedom to experiment is why I continue to love homebrewing. Taking a simple ingredient and preparing it in a new way, like smoking pumpkin seeds in Alderwood or torching pistachios, can really add depths of flavor to your brew.

Having tasted a few well-executed local nut inspired brews, I wanted to experiment infusing other nut/seed flavors into my homebrew. I spoke with an expert on the subject of experimental homebrewing, Randy Mosher (author of "Radical Brewing"), on different ways to extract and infuse seed flavor. From our talk I came up with a few flavor extraction processes to test.



Small baking pumpkins have the best flavor.



Cubes of roasted pumpkin, ready to mash.

Thinking Outside the "Shell"

Many homebrewers I had spoken to on the topic were reluctant to experiment with nuts or seeds due to their high oil content. In finished beer, oils form a slick on the surface and block foam building molecules from actually becoming foam. (On the other hand, Grady Hull of New Belgium Brewing has shown that small amounts of olive oil added in the boil can supply yeast with needed nutrients and be an alternative to wort aeration.) I found that if you balance your recipe with ingredients to help head retention, the small amount of oil is not an issue. Altering your mash schedule, adding grains like crystal, wheat, or Carafoam® and using more alpha acids from hops can enhance head-retaining proteins.

The stars for the experiment included pecan, pistachio, sunflower seed and pumpkin seed. Some of the nut flavor extraction methods to test were making a tea by steeping the nuts, freezing the extract, scraping off the top layer of fats and adding to secondary. Other methods involved "dry seeding" in secondary fermentation, mashing in with toasted seeds and boiling with roasted nuts. I really was impressed with the flavors pulled into the beer as well as how the beers had great head retention. All of these beers were served at my annual fall brew tasting gathering and some were greeted with skepticism. Once the brews were tasted, the majority of people couldn't put them down. I say get creative and get inspired to try brewing with some new ingredients that you have never thought about brewing with before. Take note of rare fruits, nuts and roots when browsing the aisles of your neighborhood grocery store or research historical brewing texts for gems from the past.

The pumpkins in the smoker.

SMOKED PUMPKIN SAISON

Pumpkin style ales and lagers originated in the U.S. by microbreweries looking to put the flavors of pumpkin pie into a bottle. The flavor of pumpkin beer is delicate pumpkin usually overpowered by traditional pumpkin pie spice mix. The aroma has a nice spiciness, perhaps a little malt and balanced by a little sweetness.

Some brewers add caramel malt which adds some interest and going even further with pumpkin they actually malt pumpkin seeds and use them in the mashing process.

Pumpkin spice ales and lagers are the most common styles of this gourd-like brew, but the saison style has some peppery spice undertones I thought

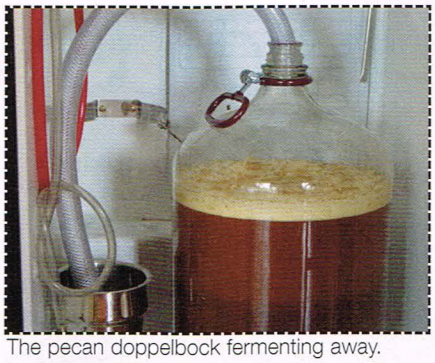
might balance well. The normal gravity range for pumpkin ale is 1.047–1.056 with an ABV range of 4.9–5.5%. Bitterness is low on this beer, around 10–15 IBU with color 6–12 SRM and attenuation medium. The normal gravity for a traditional saison is 1.055–1.080 with ABV range of 4.5-8.1%. Bitterness is medium to high on this beer around 20–45 IBU with color 6-12 SRM and attenuation high, for a dry beer.

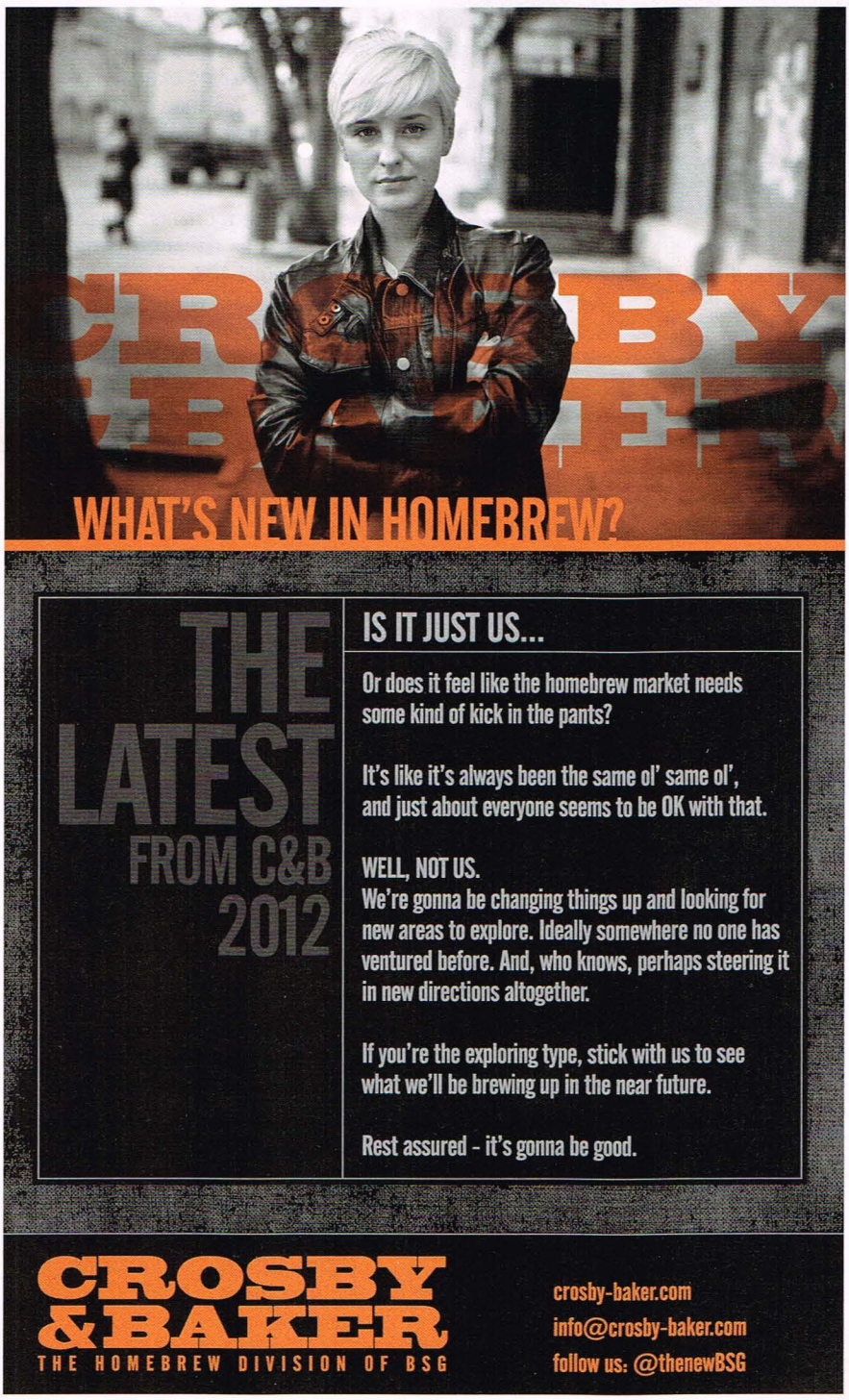
By blending together these two styles I arrived at some interesting results. (Recipe on page 30.)The additions of pumpkin and brown sugar gave the yeast more sugars to convert to alcohol making this brew on the higher end of the ABV and Lovibond scale for the saison style. The White Labs Platinum Saison II yeast (WLP566) was moderately phenolic, with a clove-like characteristic and aroma. The pumpkin played nice with the fruity ester production of this yeast.

To add another layer of complexity to this beer's body, I smoked whole organic pumpkins and pumpkin seeds on trays in my wood smoker. I chose alderwood (from the website SmokerWoodChunks.com) for what I believe is one of the smoothest, real wood smoke flavors available. Smoking 3–7 lbs (1.4–3.2 kg) of pumpkin at temperatures of 250–300 °F (121–149 °C) took around 3 hours. Using 5–20% pumpkin in your recipe is a nice rule of thumb when dealing in squashy fermentables. The addition of pumpkin in the mash, whether it be from a can or freshly cooked, may increase viscosity, causing runoffs in the grain bed, so I added rice hulls. Adding rice hulls to the mash is recommended when lautering with pumpkin to provide bulk and help prevent the mash from settling and becoming stuck during the runoff and when sparging.

Yeast starter for the doppelbock.

Pecans have a distinct "buttery" flavor.


The pecan doppelbock fermenting away.



NUTS & SEEDS recipes

Smoked Pumpkin Seed Saison
(5 gallons/19 L, all-grain)

OG = 1.071 FG = 1.020
IBU = 24 SRM = 15 ABV = 6.6%

Ingredients

11.5 lbs. (5.2 kg) 2-row pale malt
0.5 lb. (0.23 kg) wheat malt
0.5 lb. (0.23 kg) crystal malt
0.5 lb. (0.23 kg) biscuit malt
1.0 lb. (0.45 kg) brown sugar
3.0 lbs. (1.4 kg) smoked pumpkin and seeds
1.0 lb. (0.45 kg) rice hulls
3.5 AAU Styrian Goldings hops (60 mins)
(0.7 oz./19 g of 5% alpha acids)
2.5 AAU Saaz hops (20 mins)
(0.63 oz./18 g of 4% alpha acids)
4 cloves (10 mins)
5 cinnamon sticks (10 mins)
4 nutmeg (cracked) (10 mins)
1 tsp. Irish moss (15 mins)
White Labs WLP566 (Platinum Belgian Saison II) yeast
(3 qt./3 L yeast starter)

Step by Step

Smoke pumpkin chunks at 250–300 °F (121–149 °C) until soft (about 3 hours). As an option, you can roast the pumpkin seeds separately on a cookie sheet in a 325 °F (162 °C) oven until browned (about 15 minutes). Mash grains, smoked pumpkin chunks and seeds at 153 °F (67 °C) in 4.5 gallons (17 L) of water for 60 mins. Lauter slowly to prevent stuck mash. Boil wort for 60 minutes, adding hops and spices at times indicated. Ferment at 68 °F (20 °C). Rack to secondary at 14 days.

Partial mash option:

Decrease amount of 2-row pale malt to 2.5 lbs. (1.1 kg). Add 1.0 lb. (0.45 kg) light dried malt extract and 5.0 lbs. (2.3 kg) light liquid malt extract. See all-grain recipe for how to process pumpkin and seeds. Add 6.7 qts. (6.2 L) of 164 °F (73 °C) water to a 5-gallon (19-L) beverage cooler (Gott or Rubbermaid, the kind they use on the sidelines of sporting events.) Place crushed grains and pumpkin solids in a (very) large nylon steeping bag. Submerge bag, stirring constantly, then add additional hot water, if needed, until grains and pumpkin pieces are just submerged. Mash at 153 °F (67 °C) for 60 minutes. Recirculate by drawing off about 2 cups and adding it to top of grain bed. Repeat until you've recirculated about 4 or 5 qts. (~4–5 L). Run off wort by collecting about 2 cups of wort, then adding that same volume of sparge water — at 170 °F (77 °C) — to the top of the grain bed. Collect about 2.75 gallons (10 L) of wort. Add dried malt extract and water to make 3.0 gallons (11 L). Boil wort for 60 minutes, adding hops and spices at times indicated. Add liquid malt extract in the final 15 minutes of the boil. Cool wort and top up to 5 gallons (19 L). Aerate and pitch yeast. Ferment at 68 °F (20 °C).

Pecan Doppelbock
(5 gallons/19 L, all-grain)

OG = 1.090 FG = 1.022
IBU = 28 SRM = 10 ABV = 9.0%

Ingredients

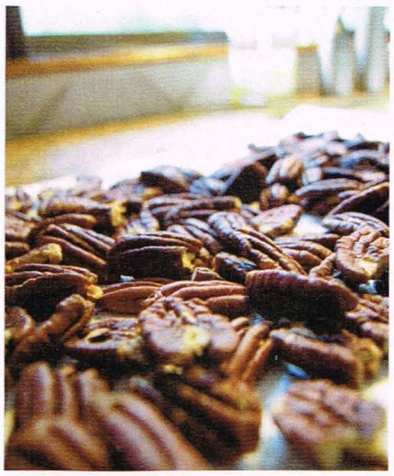
11.5 lbs. (5.2 kg) British 2-row pale ale malt
6.0 lb. (2.7 kg) German Munich malt
1.0 lb. (0.45 kg) aromatic malt
0.5 lb. (0.23 kg) CaraPils® malt
5 AAU Hallertauer hops (90 mins)
(1.0 oz./28 g of 5% alpha acids)
2.5 AAU Hallertauer hops (45 mins)
(0.5 oz./14 g of 5% alpha acids)
5 AAU Hallertauer hops (10 mins)
(1.0 oz./28 g of 5% alpha acids)
1 tsp. Irish moss
(15 mins)
Wyeast 2206 (Bavarian Lager) yeast
(8 qt./8 L yeast starter)

Step by Step

Pecans can be toasted on a cookie sheet in a 350 °F (176 °C) oven until browned (about 5–10 minutes). Mash at 125 °F (52 °C) for 30 minutes. Add 1 cup crushed pecan for this rest. Next, rest at 153 °F (67 °C) for 45 minutes. Add 2 cups crushed pecan at this rest. Boil wort for 90 minutes. Ferment at 50 °F (10 °C). Diacetyl rest at 65 °F (18 °C) for 2 days before racking to secondary. Condition in secondary at 45 °F (7.2 °C).

Pecan Doppelbock
(5 gallons/19 L, extract with grains)

OG = 1.090 FG = 1.022
IBU = 28 SRM = 10 ABV = 9.0%



Ingredients

0.5 lb. (0.23 kg) German Munich malt
1.0 lb. (0.45 kg) aromatic malt
0.5 lb. (0.23 kg) CaraPils® malt
4.5 lb. (2.0 kg) Muntons Light dried malt extract
6.0 lbs. (2.7 kg) Munich liquid malt extract
5 AAU Hallertauer hops (90 mins)
(1.0 oz./28 g of 5% alpha acids)
2.5 AAU Hallertauer hops (45 mins)
(0.5 oz./14 g of 5% alpha acids)
5 AAU Hallertauer hops (10 mins)
(1.0 oz./28 g of 5% alpha acids)
1 tsp. Irish moss (15 mins)

NUTS & SEEDS recipes

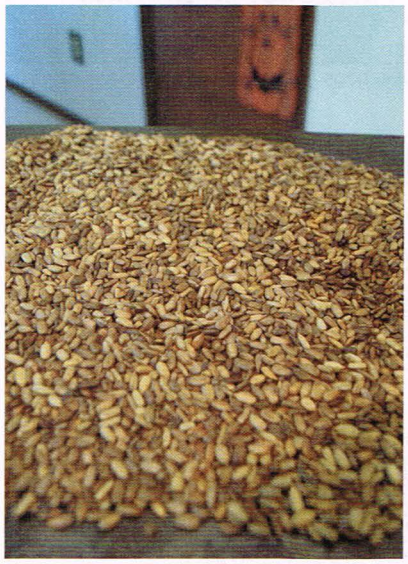
Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Pecans can be toasted on a cookie sheet in a 350 °F (176 °C) oven until browned (about 5–10 minutes). Steep at 153 °F (67 °C) for 45 minutes, with 3 cups of crushed pecans added to grain steeping bag. Boil wort for 90 minutes, adding hops at times indicated. Ferment at 50 °F (10 °C). Diacetyl rest at 65 °F (18 °C) for 2 days before racking to secondary. Condition in secondary at 45 °F (7.2 °C).

Sunflower Seed Dark Hefeweizen
(5 gallons/19 L, all-grain)

OG = 1.062 FG = 1.014
IBU = 26 SRM = 9 ABV = 6.3%



Ingredients

6.5 lbs. (2.9 kg) wheat malt
6.0 lb. (2.7 kg) German Pilsner malt
2 oz. (57 g) Carafa® I malt
5 AAU Magnum hops (70 mins)
(0.35 oz./10 g of 14% alpha acids)
2.5 AAU Hallertauer hops (15 mins)
(0.5 oz./14 g of 5% alpha acids)
8 oz. (0.23 kg) toasted sunflower seeds
White Labs WLP380 (Hefeweizen IV) ale yeast
(2.4 qts./2.4 L yeast starter)

Step by Step

Roast sunflower seeds at 450 °F (232 °C) for 15–20 minutes. Mash at 122 °F (50 °C) 30 minutes; Rest at 152 °F (67 °C) for 60 minutes. Boil for 70 minutes, adding hops at times indicated. Ferment at 66–70 °F (19–21 °C). Rack to secondary after 10 days. "Dry seed" the beer in secondary. Remove seeds after a couple days, or when desired level of sunflower flavor is reached. Force carbonate to 3.2 volumes of CO_2.

Sunflower Seed Dark Hefeweizen
(5 gallons/19 L, extract with grains)

OG = 1.062 FG = 1.014
IBU = 26 SRM = 9 ABV = 6.3%

Ingredients

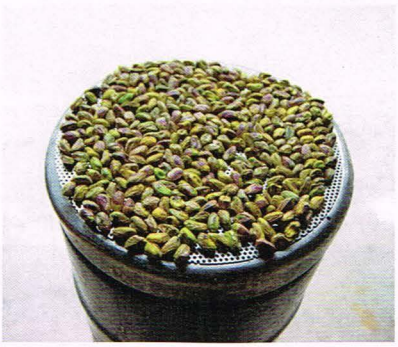
1.0 lb. (0.45 kg) wheat malt
14 oz.. (0.40 kg) German Pilsner malt
2.0 oz. (57 g) Carafa® I malt
2.5 lb. (1.1 kg) dried wheat malt extract
4.5 lbs. (2.0 kg) liquid wheat malt extract
5 AAU Magnum hops (70 mins)
(0.35 oz./10 g of 14% alpha acids)
2.5 AAU Hallertauer hops (15 mins)
(0.5 oz./14 g of 5% alpha acids)
8 oz. (0.23 kg) toasted sunflower seeds
White Labs WLP380 (Hefeweizen IV) ale yeast

Step by Step

Roast sunflower seeds at 450 °F (232 °C) for 15–20 minutes. Steep crushed grains at 152 °F (67 °C) for 60 minutes. Add dried malt extract and water to make 3 gallons (11 L) and boil wort for 70 minutes, adding hops at times indicated. Add liquid malt extract for final 15 minutes of the boil. Ferment at 66–70 °F (19–21 °C). Rack to secondary after 10 days. "Dry seed" the beer in secondary for 2 or 3 days. Force carbonate to 3.2 volumes of CO_2.

Pistachio Pale Ale
(5 gallons/19 L, all-grain)

OG = 1.052 FG = 1.011
IBU = 46 SRM = 6 ABV = 5.3%



Ingredients

5.0 lbs. (2.3 kg) 2-row pale malt
4.25 lbs. (1.9 kg) British pale ale malt
1.0 lb. (0.45 kg) flaked oats
0.5 lbs. (0.23 kg) crystal malt (10 °L)
0.25 lbs. (0.11 kg) crystal malt (40 °L)
10 AAU Palisades hops (60 mins)
(1.0 oz./28 g of 10% alpha acids)
5 AAU Palisades hops (15 mins)
(0.5 oz./14 g of 10% alpha acids)
5 AAU Palisades hops (5 mins)
(0.5 oz./14 g of 10% alpha acids)
1 tsp. Irish moss (15 mins)
24 oz. (680 g) roasted pistachios
Danstar Nottingham Ale yeast

Step by Step

Mash at 153 °F (67 °C) for 60 minutes. Boil wort for 60 minutes, adding hops at times indicated. Ferment at 68 °F (20 C). Roast pistachios with propane torch. Steep in 3 cups boiled water. Freeze liquid and scrape off any fats that rise to top. Thaw and add mixture to secondary.

Extract with grains option:

Reduce amount of 2-row pale malt to 1.5 lbs. (0.68 kg). Add 1.0 lb. (0.45 kg) light dried malt extract and 3.5 lbs. (1.6 kg) light liquid malt extract Steep oats and crushed grains at 153 °F (67 °C) for 60 minutes. Add dried malt extract and water to make 3 gallons (11 L). Boil wort for 60 minutes, adding hops at times indicated and liquid malt extract in the final 15 minutes of the boil. Cool wort and transfer to fermenter. Aerate and pitch yeast. Ferment at 68 °F (20 °C). Roast pistachios. Steep in 3 cups boiled water. Freeze liquid and scrape off any fats that rise to top. Thaw and add mixture to secondary.

The spicing mixtures vary for pumpkin beers, but normally are made up of cinnamon, nutmeg, allspice, cloves, anise or ginger. The spices can be added at the end of the boil or they can be added during secondary fermentation (as with dry hops).

ROASTED PECAN DOPPELBOCK

I am calling this beer (see recipe on page 30) The Mischievous Squirrel. This is a strong Bavarian style doppelbock that will warm you up pre-winter. As a homebrewer, you really get in tune with the seasons and changing weather. Make sure you are brewing a style that you and others will enjoy too. I chose a doppelbock because of its rich, full-bodied, caramel malty flavor, blanketed light hop aroma with a light ruby-hazed color. This style with the pecan addition just screams Thanksgiving to me.

In the traditional German way of the style, you would do a decoction mash, but I chose a step mash instead. I've tried decoction mashing in the past and it results in a great beer, but you get relatively the same result with a step mash and for the homebrewer it is not as involved as dealing with multiple kettles of mash. I'll let other brewers tackle the decoction stuff while I brew a second batch.

Now, let's talk yeast. You need a big pitch for a doppelbock whether you are using vials, smack packs or

Sunflowers produce flavorful, oily seeds.

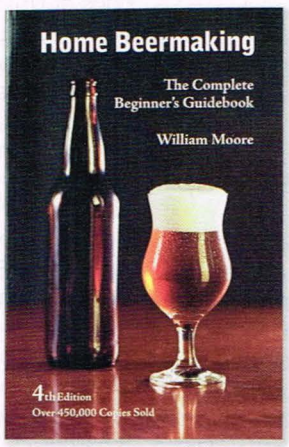
"Dry seeding" the sunflower seed ale.

Noble hops for the hefeweizen.

Home Beermaking

by William Moore

New 4th edition



Home Beermaking has sold over 450,000 copies since first being published in 1980. This completely rewritten 4th edition includes updated recipes for everything from Honey Cream Ale to Belgian Triple. A classic beginner's book. Available now at fine home brewing retailers.

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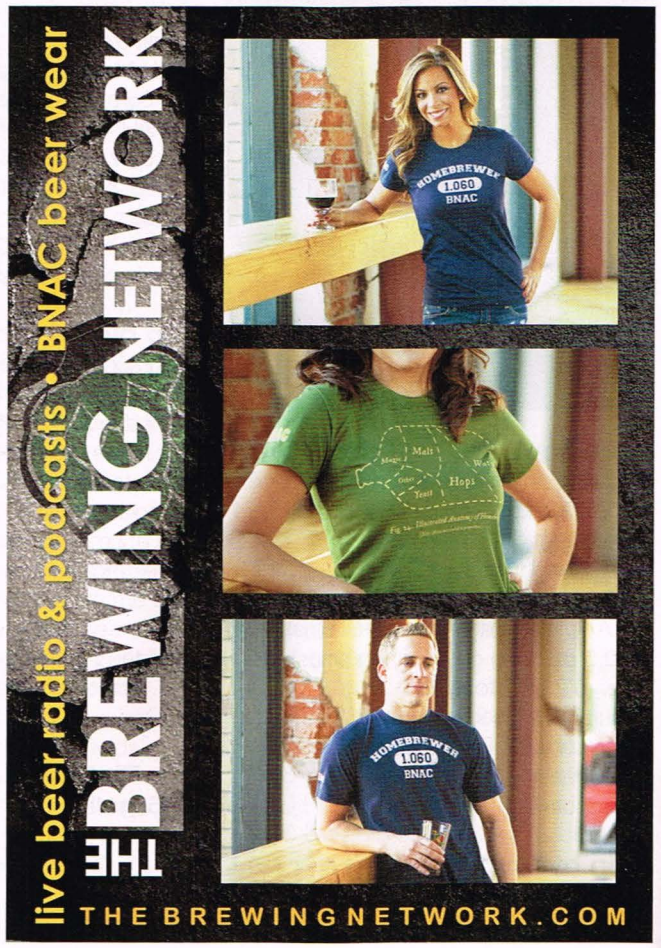

using your own harvested yeast and starter, make sure it's big and aerate your wort well before the pitch. A final note is about the diacetyl levels. Remember to do a diacetyl rest for two days at 65 °F (18 °C) before you rack into secondary.

A few good places to find Pecans online are at Pecans.com and AustinNuts.com.

TOASTED SUNFLOWER SEED DARK HEFEWEIZEN

The bright sunny days of summer were coming to an end, and in honor of its passing I concocted a nutty dark hefeweizen to help ease me into Fall. (See the recipe on page 31.) Bavarian hefeweizen originated in Munich, Germany and was a originally a monopoly of the royal family. This style of beer was hugely popular in the 18th Century all over Bavaria.

The flavor of hefeweizen can best be summed up as a light graininess with milkshake texture and not too much in the way of hops.

Hefeweizens use one-half to two-thirds wheat malt, with the balance being two-row barley malt. Wheat malt extract, which is usually made from a 50:50 blend of wheat and barley malts, may be substituted for all or part of the grain bill. This style beer is always highly carbonated which actually is a flavor component of the style. The aroma is fruity (banana) and spicy (cloves) and is traditionally enjoyed in the summer months. The normal gravity range for hefeweizen is 1.047–1.056 with an ABV range of 4.9–5.5%. Bitterness is low on this beer, around 10–15 IBU with color 3–9 SRM. Attenuation is moderate, leaving a medium-bodied beer.

This recipe takes advantage of the head retention power of wheat to blend in some flavors of toasted sunflower seeds. Sunflower seeds are very oily, so toasting the seeds to get a large amount of the oils removed is essential. Secondary fermentation is where the sunflower seeds were introduced in a process I call dry seeding, as this is analogous to dry hopping. Consider malting the sunflower seeds and using the seeds in the mash process, too. Note:

Don't be afraid to try out interesting new ingredients in your homebrewery.

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A propane torch browns the pistachios.

The liquid pistachio extract.

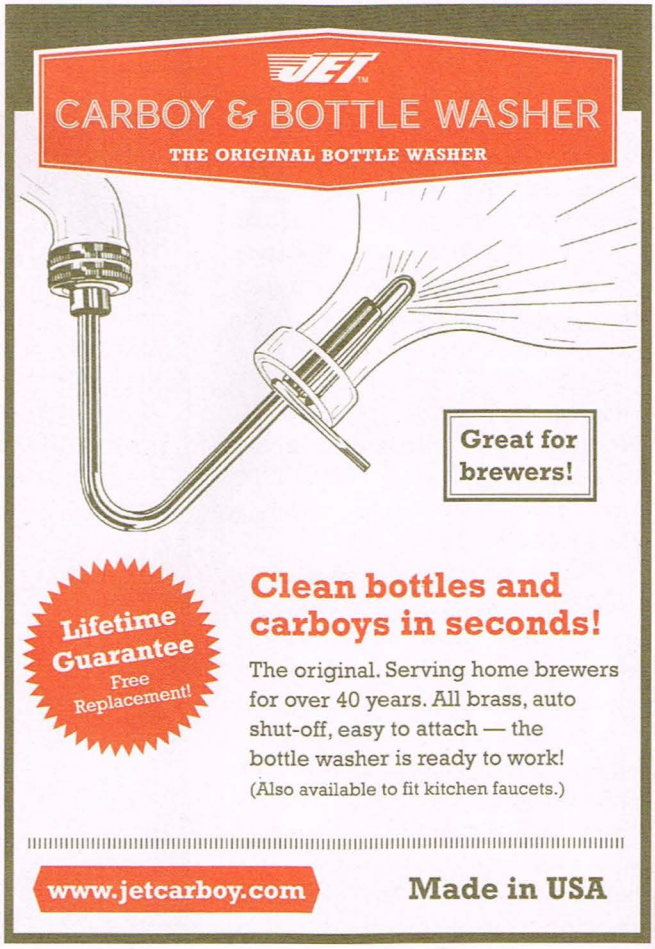
> "To add an additional layer of complexity, I combined natural pistachio flavors with the beer during secondary fermentation using a steeping tea method."

Carbohydrates are low in these seeds compared to fully-modified malted grain. They run 7–14% carbs vs. 75% for barley and other grains.

As for the brewing water profile, I typically will need to add a little $CaCl_2$ (calcium chloride) to obtain the proper mash pH, but you will need to learn what is in your water to figure out the correct treatment. (If you've brewed good pale-colored beers before your water will be fine for a hefeweizen. If your dark beers always turn out better than your pale beers, try diluting your usual water 1:1 with RO or distilled water.) For this style, I used a water profile between Pilsen and Munich which is moderate in most minerals. The yeast I used for this recipe was White Labs WLP300 (Hefeweizen IV) yeast, which produces lots of clove and phenolic aroma and flavor, with minimal banana.

TORCHED PISTACHIO PALE ALE

What's better than drinking beer and eating pistachios? Smashing them together (of course) and making citrusy pale ale using Palisade hops with a



smoky pistachio kick.

Classic American pale ales came about in the 1980s, as American brewers tried to satisfy their thirst for hops. The flavor is of fresh hops with a crisp finish. The brew is usually malty with a little bit of caramel flavor, but with American (often Cascade) hops in the foreground. The normal gravity range for an American pale ale is 1.044–1.050+ with an ABV range of 4.5–5.5%. Bitterness is medium to high on this beer and can range anywhere from 28-40 IBUs with color 6-14 SRM and attenuation medium. The carbonation level for the style is 2.2–2.7 volumes of CO_2.

I used Palisade hops in this recipe which are an American hop similar to Cascade and Ahtanum that gave the brew a nice, crisp, bitter finish. To add an additional layer of complexity, I combined natural pistachio flavors with the beer during secondary fermentation using a steeping tea method.

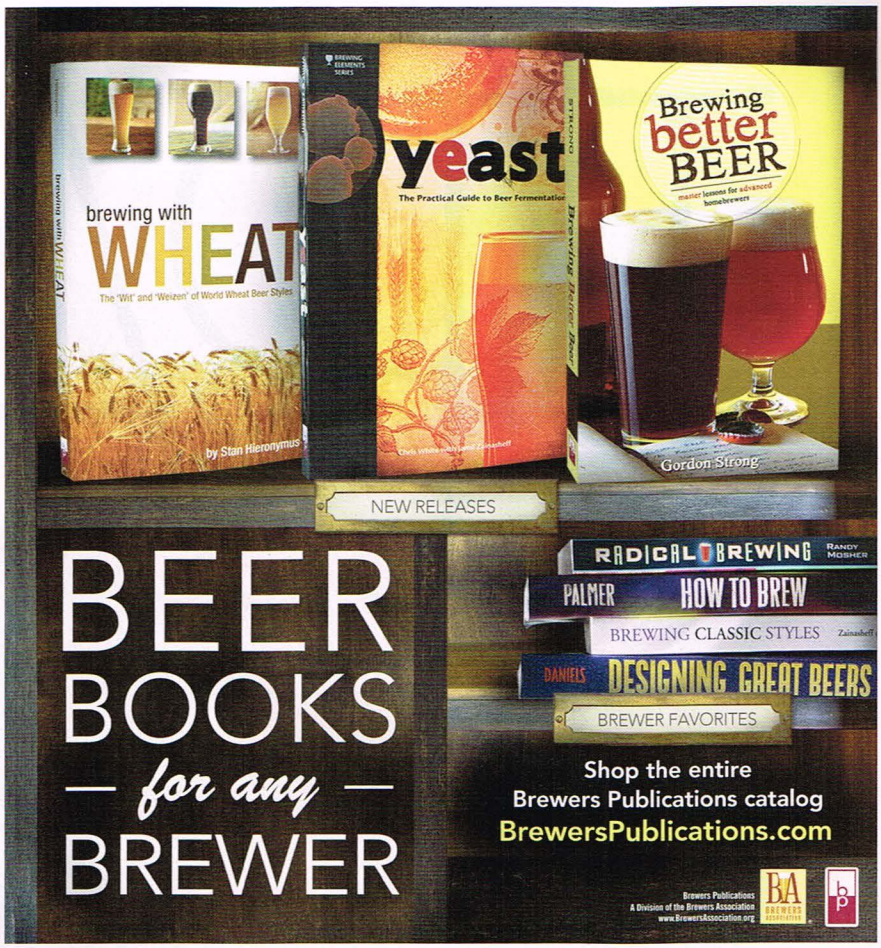
During the experiment with this recipe, I torched organic shelled pistachios with a propane blow torch until lightly browned, partially cracked the pistachios and placed them in a grain bag. Next, I boiled three cups of water and steeped the pistachios for 15 minutes. Finally, I froze the mixture and scraped off the fats that rose to the top and then added the remaining pistachio tea during secondary fermentation. You can use this method for a number of nuts and seeds with high oil or fat contents.

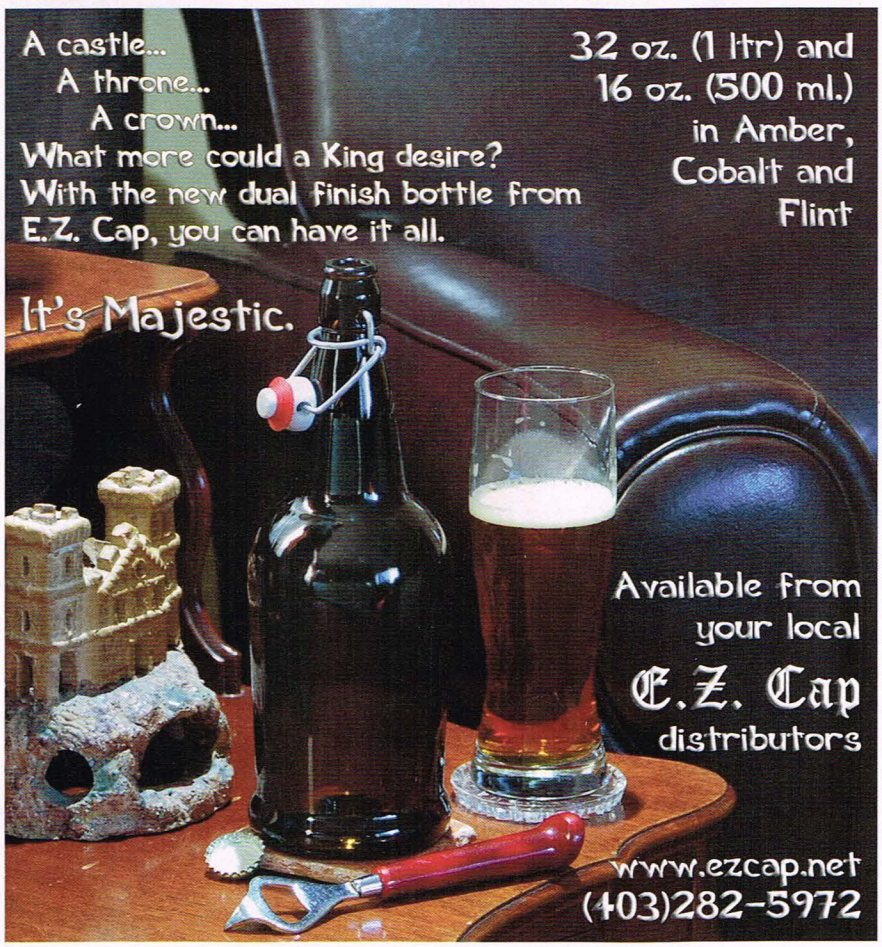
The Nottingham ale yeast I used was highly flocculent and was highly attenuative. The pistachio character really came through nicely with the low fruity ester production of this yeast.

Online sources for organic shelled pistachios include OrganicPistachios.com or Braga Organic Farms.

There are many options when it comes to adding nuts and seeds to your beers. They can be added in the mash, boil, fermentation or keg. You may need to roast or toast them to bring out their flavors, but a little experimentation should reveal the best plan. BYO

Christian Lavender is a frequent contributor to Brew Your Own.





IPA 2.0

THE CONTINUED EVOLUTION OF IPA

Brewing the beer style known as IPA (India pale ale) has, at times, become a game of one-upmanship in which each succeeding brew gets more hops, more malts, more alcohol — more of all the good stuff we love about beer. Here on the West Coast, we keep pushing the limits of this beloved style and are proud of it. Pushing the limits is part of our tradition culturally, but also as a beer producing region. For example, a traveler named William Minturn wrote in 1877 about California beer in his book, "Travels West:"

"We then had a glass of California beer, which is thoroughly good, and one gets a taste of the hops very strongly." (Thanks to beer author Ken Weaver for sleuthing that quote.)

Keeping true to our historic love of hops, West Coast IPA brewing has emerged as a clear favorite in homebrewing popularity. IPA appears to be so "large and in-charge" that the style is bleeding into other styles . . . or you could say it is devouring other styles. Here at The Beverage People (the homebrew shop in Santa Rosa, California that I work at), we have retired the long-lived and long-loved barleywine beer kit and replaced it with an imperial IPA kit. This new style, Imperial IPA, is only one of several new variants on India pale ale to emerge. Homebrewers are now also venturing into Black IPAs, wheat IPAs, rye IPAs and even Belgian IPAs. And why not?! Each of these new styles gives a whole different flavor profile, and a whole different way to revel in our hop addiction. So let's take a look at these new IPA variants and how brewers have been succeeding with them.

In each sub-style you want to focus on different malts and hops to end up with flavors that play well together, either enhancing each other or providing balance. Analyzing the strategies and ingredients used to produce these variants is a good way to get to know some of the most popular specialty malts and modern hops used in brewing. Before we delve into the particulars of these new styles, however, let's begin at the center of the style — American IPA.

IPA 1.0

American IPA evolved from its British origins into a hop-centric, thirst quenching delight. Recipes tend to have very simple malt bills that play a background role to the citrusy American hops of choice. The yeast can be either neutral or fruity,

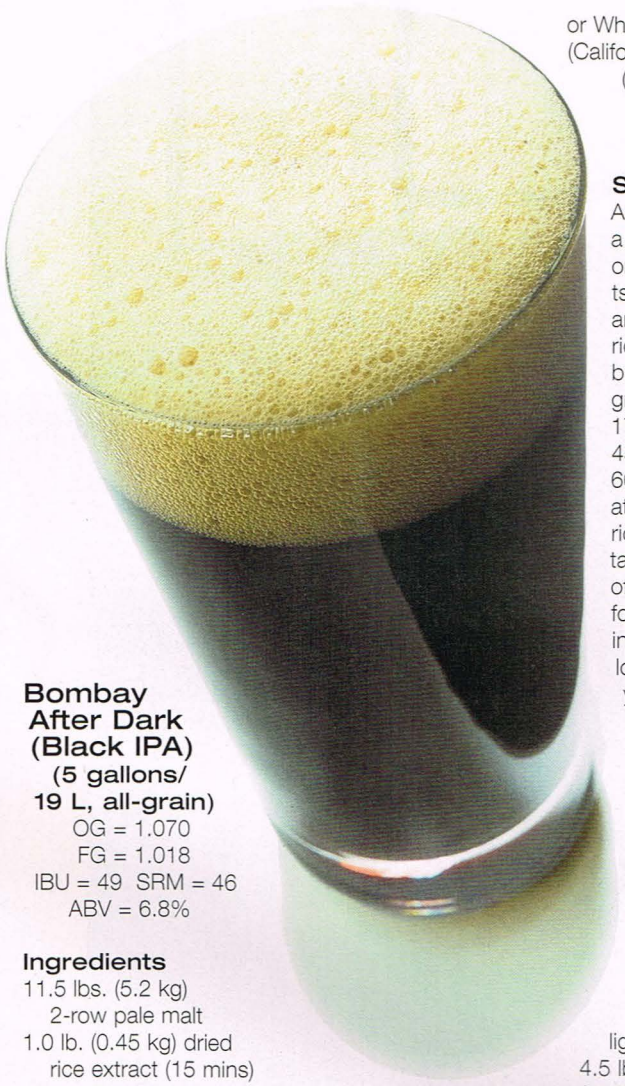
Continued on page 42

> "We then had a glass of California beer, which is thoroughly good, and one gets a taste of the hops very strongly."
> — William Minturn, 1877

Photos by Charles A. Parker/Images Plus

Story by **Gabe Jackson**

IPA 2.0 RECIPES: BLACK IPA



Bombay After Dark (Black IPA)
(5 gallons/ 19 L, all-grain)

OG = 1.070
FG = 1.018
IBU = 49 SRM = 46
ABV = 6.8%

Ingredients

11.5 lbs. (5.2 kg) 2-row pale malt
1.0 lb. (0.45 kg) dried rice extract (15 mins)
12 oz. (0.34 kg) flaked barley
8.0 oz. (0.23 kg) chocolate malt (625 °L)
8.0 oz. (0.23 kg) caramel malt (80 °L)
6.0 oz. (0.17 kg) Carafa® Special I malt (300 °L)
4.0 oz. (0.11 kg) extra dark caramel malt (120 °L)
2 whirlfloc tablets (or 2 tsp. Irish moss)
8.8 AAU Cascade hops (60 mins) (1.1 oz./31 g of 8% alpha acids)
1.0 oz. (28 g) Columbus hops (5 mins)
1.0 oz. (28 g) Columbus hops (0 mins)
1.0 oz. (28 g) Chinook hops (0 mins)
1.0 oz. (28 g) Chinook hops (dry hops)
6.0 oz. (170 g) corn sugar (for priming)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale), Fermentis US-05, Wyeast 1272 (American Ale II) or White Labs WLP051 (California V) yeast (2.5 qt./2.5 L yeast starter or 10 grams of dried yeast)

Step by Step

Adjust water chemistry for a dark beer. (If using RO or distilled water, add 1 tsp. chalk, ½ tsp. gypsum and ¼ tsp. calcium chloride per 6 gallons/23 L of brewing liquor). Mash grains at 153 °F (67 °C) in 17 qts. (16 L) of water for 45 minutes. Boil wort for 60 minutes, adding hops at times indicated. Add rice extract and whirlfloc tablets for final 15 minutes of the boil. Whirlpool wort for 5 minutes before chilling. (Skipping this step will lower the bitterness of your beer.) Cool wort, aerate well and pitch yeast. Ferment at 62 °F (17 °C). Dry hop for 4 to 7 days.

Partial mash option:

Reduce the amount of 2-row pale malt to 1 lb. 10 oz. (0.73 kg). Add 2.0 lbs. (0.91 kg) light dried malt extract and 4.5 lbs. (2.0 kg) light liquid malt extract. (Try Briess or any other light or pale malt extract made in North America for this recipe.) You will need a 2-gallon (7.8-L) beverage cooler and a large steeping bag to follow these instructions. Add pale malt, flaked barley and crystal malt (80 °L) to grain bag. Add 3.5 qts. (3.4 L) of 164 °F (73 °C) water to cooler and submerge bag. Let "steep" for 10 minutes. Open bag and stir in remaining dark grains, 2.0 qts. (1.8 L) of 164 °F (73 °C) water and ½ tsp chalk (calcium carbonate). Let rest for another 35 minutes. Heat 5.5 qts. (5.2 L) of water to 180 °F (82 °C) near end of rest. Run off wort by collecting about 2 cups of wort from the cooler, then adding the same volume of hot water to the top of the grain bed. Repeat until you collect about 2.5 gallons (9.5 L) of wort this way. Stir in dried malt extract and bring wort to a boil. Finish beer by following the remaining instructions in the extract with grains recipe, starting with the boil. (Add liquid malt extract late in the boil.)

Bombay After Dark (Black IPA)
(5 gallons/19 L, extract with grains)

OG = 1.070 FG = 1.018
IBU = 49 SRM = 46 ABV = 6.8%

Ingredients

6.25 lbs. (2.8 kg) light dried malt extract (such as Briess or Alexander's)
6.0 oz. (0.17 kg) 2-row pale malt
1.0 lb. (0.45 kg) dried rice extract (15 mins)
8.0 oz. (0.23 kg) chocolate malt (625 °L)
8.0 oz. (0.23 kg) caramel malt (80 °L)
6.0 oz. (0.17 kg) Carafa® Special I malt (300 °L)
4.0 oz. (0.11 kg) extra dark caramel malt (120 °L)
2 whirlfloc tablets (or 2 tsp. Irish moss)
8.8 AAU Cascade hops (60 mins) (1.1 oz./31 g of 8% alpha acids)
1.0 oz. (28 g) Columbus hops (5 mins)
1.0 oz. (28 g) Columbus hops (0 mins)
1.0 oz. (28 g) Chinook hops (0 mins)
1.0 oz. (28 g) Chinook hops (dry hops)
6.0 oz. (170 g) corn sugar (for priming)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale), Fermentis US-05, Wyeast 1272 (American Ale II) or White Labs WLP051 (California V) yeast

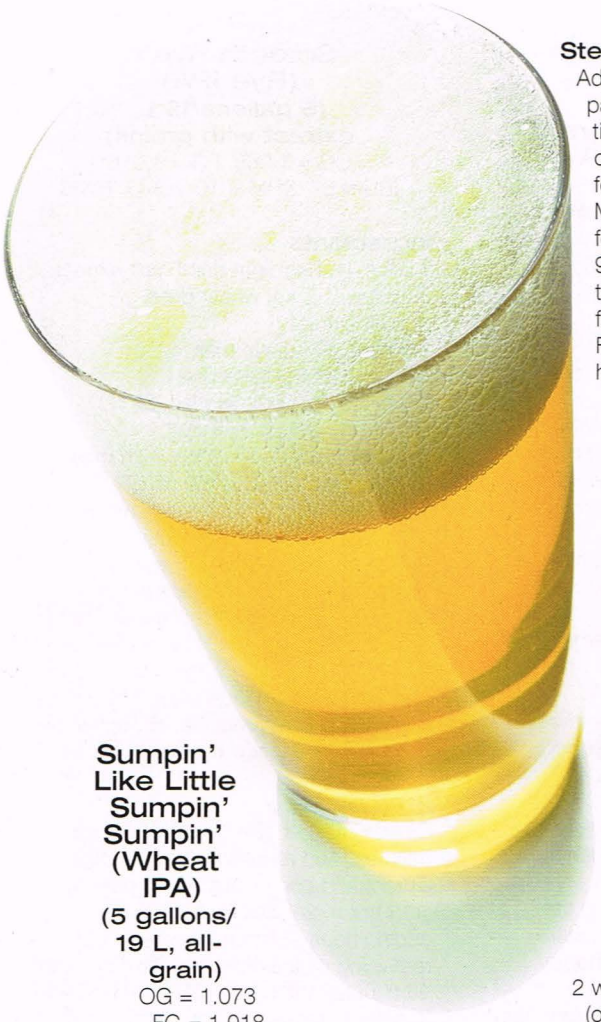
Step by Step

Steep for 45 minutes at 153 °F (67 °C) in 2.8 qts. (2.6 L) of water. Rinse grain bag with 1.5 qts. (1.4 L) of water at 170 °F (77 °C). Add water and dried malt extract to "grain tea" to make at least 3 gallons (11 L). Boil wort for 60 minutes, adding hops at times indicated. When 15 minutes remain in the boil, add whirlfloc and stir in rice extract. Whirlpool for 5 minutes after the heat is turned off. (Just stir the wort to get it rotating, then put the cover on your brewpot). Chill wort and transfer to fermenter. Add water to make 5 gallons (19 L). Aerate well and pitch yeast. Ferment at 62 °F (17 °C). Dry hop for 4 to 7 days.

Tips For Success

Review all you know about the appropriate water chemistry for dark beers.

IPA 2.0 RECIPES: WHEAT IPA



Sumpin' Like Little Sumpin' Sumpin' (Wheat IPA)

(5 gallons/19 L, all-grain)

OG = 1.073
FG = 1.018
IBU = 63 SRM = 8
ABV = 7.1%

Ingredients

10.0 lb. (4.5 kg) 2-row pale malt
4.0 lbs. (1.8 kg) wheat malt
1.0 lb. (0.45 kg) flaked wheat
2.0 oz. (56 g) Victory® malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
9.8 AAU Nugget hops (90 mins) (0.75 oz./21 g at 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g at 3% alpha acids)
8 AAU Cascade hops (15 mins) (1.0 oz./28 g of 8% alpha acids)
1.0 oz. (28 g) Chinook hops (2 mins)
1.0 oz. (28 g) Amarillo™ hops (2 mins)
1.0 oz. (28 g) Cascade hops (dry hops)
6.0 oz. (170 g) corn sugar (for priming)
White Labs WLP090 (San Diego Super) yeast (2.5 qt./2.5 L yeast starter)

Step by Step

Place crushed grains in a large steeping bag. Add 5.6 qts. (5.4 L) of 163 °F (73 °C) water to a 2-gallon (7.8-L) beverage cooler. Submerge bag and mash grains at 152 °F (67 °C) for 45 minutes. Run off and sparge with 170 °F (77 °C) water to collect about 2.5 gallons (9.5 L) of wort. Add dried malt extract and bring volume to 3.0 gallons (11 L) or more. Boil wort for 90 minutes, adding hops at times indicated. Add whirlfloc for final 15 minutes of the boil. Ferment at 67 °F (19 °C). Dry hop for 4 to 7 days.

Sumpin' Like Little Sumpin' Sumpin' (Wheat IPA)

(5 gallons/19 L, partial mash)

OG = 1.073 FG = 1.018
IBU = 63 SRM = 8
ABV = 7.1%

Ingredients

2.0 lbs. (0.91 kg) 2-row pale malt
1.0 lb. (0.45 kg) wheat malt
1.0 lb. (0.45 kg) flaked wheat
2.0 oz. (56 g) Victory® malt
2.25 lbs. (1.0 kg) light dried malt extract
5.0 lbs. (2.3 kg) wheat liquid malt extract
2 whirlfloc tablets (or 2 tsp. Irish moss)
9.8 AAU Nugget hops (90 mins) (0.75 oz./21 g at 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g at 3% alpha acids)
8 AAU Cascade hops (15 mins) (1.0 oz./28 g of 8% alpha acids)
1.0 oz. (28 g) Chinook hops (2 mins)
1.0 oz. (28 g) Amarillo™ hops (2 mins)
1.0 oz. (28 g) Cascade hops (dry hops)
6.0 oz. (170 g) corn sugar (for priming)
White Labs WLP090 (San Diego Super) yeast

Step by Step

Adjust water chemistry for a pale beer. (If using RO or distilled water, add ¼ tsp. calcium chloride and ¾ tsp. gypsum for every 6 gallons/23 L.) Mash grains at 152 °F (67 °C) for 45 minutes. Boil wort for 90 minutes, adding hops at times indicated. Add whirlfloc for final 15 minutes of the boil. Ferment at 67 °F (19 °C). Dry hop for 4 to 7 days.

Sumpin' Like Little Sumpin' Sumpin' (Wheat IPA)

(5 gallons/19 L, extract with grains)

OG = 1.073 FG = 1.018
IBU = 63 SRM = 6 ABV = 7.1%

Ingredients

5.0 lbs. (2.3 kg) wheat dried malt extract
2.0 lbs. (0.91 kg) light dried malt extract
1.0 lb. (0.45 kg) 2-row pale malt
0.5 lb. (0.23 kg) wheat malt
0.5 lb. (0.23 kg) flaked wheat
2.0 oz. (56 g) Victory® malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
9.8 AAU Nugget hops (90 mins) (0.75 oz./21 g at 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g at 3% alpha acids)
8 AAU Cascade hops (15 mins) (1.0 oz./28 g of 8% alpha acids)
1.0 oz. (28 g) Chinook hops (2 mins)
1.0 oz. (28 g) Amarillo™ hops (2 mins)
1.0 oz. (28 g) Cascade hops (dry hops)
6.0 oz. (170 g) corn sugar (for priming)
White Labs WLP090 (San Diego Super) yeast

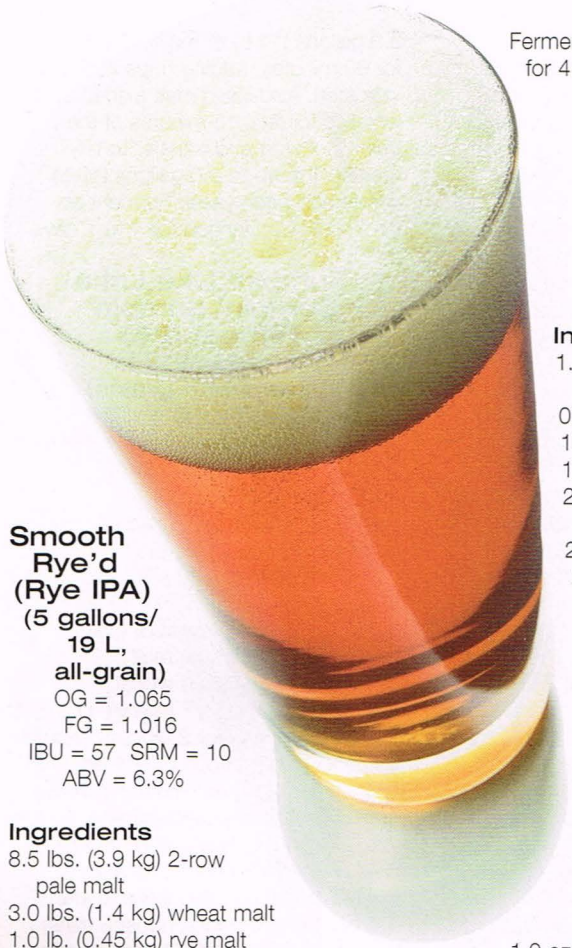
Step by Step

Steep grains at 152 °F (67 °C) for 45 minutes. Add roughly half of the malt extract and bring volume to 3 gallons (11 L) or more. Boil for 90 minutes, adding hops at times indicated. Add remaining malt extract and whirlfloc with 15 minutes left in the boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) with cool water. Aerate, pitch yeast and ferment at 67 °F (19 °C). Dry hop 4 to 7 days.

Tips For Success

Expect a lot of kräusen and try to ferment in a vessel large enough that it (and the bitterness associated with it) doesn't blow off. If you can't find the San Diego Super Yeast, any clean ale yeast (such as those found in the Black IPA recipe) will do.

IPA 2.0 RECIPES: RYE IPA



Smooth Rye'd (Rye IPA) (5 gallons/ 19 L, all-grain)

OG = 1.065
FG = 1.016
IBU = 57 SRM = 10
ABV = 6.3%

Ingredients

8.5 lbs. (3.9 kg) 2-row pale malt
3.0 lbs. (1.4 kg) wheat malt
1.0 lb. (0.45 kg) rye malt
1.0 lb. (0.45 kg) flaked rye
2.0 oz. (57 g) caramel malt (60 °L)
2.0 oz. (57 g) Victory® malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
13 AAU Nugget hops (60 mins) (1.0 oz./28 g of 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g of 3% alpha acids)
1.0 oz. (28 g) Chinook hops (5 mins)
1.0 oz. (28 g) Amarillo™ hops (dry hop)
1.0 oz. (28 g) Summit™ hops (dry hop)
6.0. oz. (170 g) corn sugar (for priming)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 yeast (or any clean ale strain) (2 qt./2 L yeast starter or 9 g dried yeast)

Step by Step

Adjust water chemistry for a pale beer. (If using RO or distilled water, add ¼ tsp. calcium chloride and ½ tsp. gypsum for every 6 gallons/23 L.) Mash grains at 150 °F (66 °C) for 45 minutes in 17 qts. (16 L) of water. Boil wort for 60 minutes, adding hops at times indicated. Add whirlfloc for final 15 minutes of the boil. Ferment at 65 °F (18 °C). Dry hop for 4 to 7 days.

Smooth Rye'd (Rye IPA) (5 gallons/19 L, partial mash)

OG = 1.065 FG = 1.016
IBU = 57 SRM = 10
ABV = 6.3%

Ingredients

1.0 lbs. (0.45 kg) 2-row pale malt
0.75 lbs. (0.34 kg) wheat malt
1.0 lb. (0.45 kg) rye malt
1.0 lb. (0.45 kg) flaked rye
2.0 oz. (57 g) caramel malt (60 °L)
2.0 oz. (57g) Victory® malt
2.25 lbs. (1.0 kg) light dried malt extract
4.0 lbs. (1.8 kg) wheat liquid malt extract
2 whirlfloc tablets (or 2 tsp. Irish moss)
13 AAU Nugget hops (60 mins) (1.0 oz./28 g of 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g of 3% alpha acids)
1.0 oz. (28 g) Chinook hops (5 mins)
1.0 oz. (28 g) Amarillo™ hops (dry hop)
1.0 oz. (28 g) Summit™ hops (dry hop)
6.0. oz. (170 g) corn sugar (for priming)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 yeast (or any clean ale strain)

Step by Step

Place crushed grains in a large steeping bag. Add 5.5 qts. (5.2 L) of 161 °F (72 °C) water to a 2-gallon (7.8-L) beverage cooler. Submerge bag and mash grains at 150 °F (66 °C) for 45 minutes. Run off and sparge with 170 °F (77 °C) water to collect about 2.5 gallons (9.5 L) of wort. (Or use hotter water, but ensure that grain bed does not rise above 170 °F/77 °C.) Add dried malt extract and bring volume to 3.0 gallons (11 L) or more. Boil wort for 60 minutes, adding hops at times indicated. Add liquid malt extract and whirlfloc for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L), aerate and pitch yeast. Ferment at 65 °F (18 °C). Dry hop for 4 to 7 days.

Smooth Rye'd (Rye IPA) (5 gallons/19 L, extract with grains)

OG = 1.065 FG = 1.016
IBU = 57 SRM = 10 ABV = 6.3%

Ingredients

3.0 lbs. (1.4 kg) light dried malt extract
3.25 lbs. (1.5 kg) wheat dried malt extract
1.5 lb. (0.68 kg) rye malt
0.5 lb. (0.23 kg) flaked rye
2.0 oz. (57 g) caramel malt (60 °L)
2.0 oz. (57 g) Victory® malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
13 AAU Nugget hops (60 mins) (1.0 oz./28 g of 13% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g of 3% alpha acids)
1.0 oz. (28 g) Chinook hops (5 mins)
1.0 oz. (28 g) Amarillo™ hops (dry hop)
1.0 oz. (28 g) Summit™ hops (dry hop)
6.0. oz. (170 g) corn sugar (for priming)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 yeast (or any clean ale strain)

Step by Step

Steep grains at 150 °F (66 °C) for 45 minutes. Add roughly half of the malt extract and bring volume to 3 gallons (11 L) or more. Boil for 60 minutes, adding hops at times indicated. Add remaining malt extract and whirlfloc with 15 minutes left in the boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) with cool water. Aerate, pitch yeast and ferment at 65 °F (18 °C). Dry hop 4 to 7 days.

Tips For Success

As the name implies, this is a smooth version of a rye IPA. It has the characteristic "snap" from rye and rye malt, but this is not as pronouced as in some rye beers. If you'd prefer a more "in your face" version, try adding a pound (0.45 kg) of rye malt to your mash (or steep) and 0.5 oz. (14 g) of Columbus hops — or any other high-cohumulone hop with a solid "bite" — at 30 minutes left in the boil. This will make a more aggressive beer, with an OG just short of 1.070 and IBUs somewhere in the 70s (depending on the alpha acid content of the hops).

Rye has the reputation of being hard to lauter, but you should have no problems with the percentage used in this recipe. If you boost the amount of rye significantly, adding rice hulls to your mash will make for easier lautering.

IPA 2.0 RECIPES: BELGIAN IPA

Tragen Babbel (Belgian IPA)
(5 gallons/19L, all-grain)

OG = 1.064
FG = 1.014
IBU = 37
SRM = 11
ABV = 6.5%

Tragen babbel is Flemish for "speak slowly."

Ingredients

9.5 lbs. (4.3 kg) 2-row pale malt
1.0 lb. (0.45 kg) clear Belgian candi sugar
1.0 lb. (0.45 kg) flaked wheat
8.0 oz. (0.23 kg) Vienna malt
8.0 oz. (0.23 kg) Caravienne® malt
8.0 oz. (0.23 kg) aromatic malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
7.5 AAU Crystal hops (60 mins) (2.5 oz./71 g of 3% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g of 3% alpha acids)
4 AAU AAU Saaz hops (15 mins) (1.0 oz./28 g of 4% alpha acids)
1.0 oz. (28 g) Citra® hops (dry hops)
1.0 oz. (28 g) Amarillo hops (dry hops)
1 package Fermentis US-05 dried yeast
1 package White Labs WLP500 (Trappist Ale) yeast
8–10 oz. (230–280 g) corn sugar (for priming)

Step by Step

Mash grains at 152 °F (67 °C) for 45 minutes in 15 qts. (14 L) of water. Boil wort for 60 minutes, adding hops at times indicated. Add whirlfloc and sugar with 15 minutes left in the boil. Cool wort below 70 °F (21 °C) and pitch dried yeast. After signs of active fermentation are present, approximately 12–24 hours, pitch the Belgian yeast. After primary fermentation is complete, add dry hops to secondary and allow 4 to 14 days before bottling. For a high carbonation level, use 8 oz. (230 g) of corn sugar in 5 gallons (19 L) when using standard beer bottles, or 10 oz. (280 g) of corn sugar in 5 gallons (19 L) when using Champagne bottles or other bottles that are rated for high pressure.

Partial mash option:

Reduce the amount of 2-row pale malt to 1.5 lbs. (0.68 kg). Add 1.25 lbs. (0.57 kg) light dried malt extract and 4.0 lbs. (1.8 kg) of light liquid malt extract. (If you can find a malt extract made from Belgian pale or Pilsner malt, use that, else use English malt extract.) You will need a 2-gallon (7.6-L) beverage cooler and a large steeping bag to follow these instructions. Add crushed grains and flaked wheat to grain bag. Add 5.5 qts. (5.2 L) of 163 °F (73 °C) water to cooler and submerge bag. Mash for 45 minutes at 152 °F (67 °C). Heat 5.5 qts. (5.2 L) of water to 180 °F (82 °C) near end of mash. Run off wort by collecting about 2 cups of wort from the cooler, then adding the same volume of hot water to the top of the grain bed. Repeat until you collect about 2.5 gallons (9.5 L) of wort this way. (Don't let the grain bed rise above 170 °F/77 °C.) Stir in dried malt extract and bring wort to a boil.

Boil wort for 60 minutes, adding hops at times indicated. Add liquid malt extract, sugar and whirlfloc for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L), aerate and pitch dried yeast. Pitch Belgian yeast once fermentation starts. Dry hop for 4 to 14 days. Bottle condition with 8 oz. (230 g) of corn sugar when using standard beer bottles, or 10 oz. (280 g) of corn sugar when using Champagne bottles.

Tragen Babbel (Belgian IPA)
(5 gallons/19L, extract with grains)

OG = 1.064 FG = 1.014
IBU = 37 SRM = 11 ABV = 6.1%

Ingredients

5.0 lbs. (2.3 kg) light dried malt extract
1.0 lb. (0.45 kg) clear Belgian candi sugar
0.5 lb. (0.23 kg) wheat malt
0.5 lb. (0.23 kg) flaked wheat
8.0 oz. (0.23 kg) Vienna malt
8.0 oz. (0.23 kg) Caravienne® malt
8.0 oz. (0.23 kg) aromatic malt
2 whirlfloc tablets (or 2 tsp. Irish moss)
7.5 AAU Crystal hops (60 mins) (2.5 oz./71 g of 3% alpha acids)
3 AAU Crystal hops (15 mins) (1.0 oz./28 g of 3% alpha acids)
4 AAU AAU Saaz hops (15 mins) (1.0 oz./28 g of 4% alpha acids)
1.0 oz. (28 g) Citra® hops (dry hops)
1.0 oz. (28 g) Amarillo™ hops (dry hops)
1 package Fermentis US-05 dried yeast
1 package White Labs WLP500 (Trappist Ale) yeast
8–10 oz. (230–280 g) corn sugar (for priming)

Step by Step

Steep grains at 152 °F (67 °C) for 45 minutes, then rinse. Add about half of the malt extract and water to make at least 3.0 gallons (11 L).

Boil wort for 60 minutes, adding hops at times indicated. Add sugar, whirlfloc and the remaining malt extract with 15 minutes left in the boil. Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L), aerate and pitch dried yeast. Pitch Belgian yeast once fermentation starts. Dry hop for 4 to 14 days. Bottle condition with 8 oz. (230 g) of corn sugar when using standard beer bottles, or 10 oz. (280 g) of corn sugar when using Champagne bottles.

Tips For Success

For a "cleaner" beer, hold the fermentation temperature steady around 68–70 °F (20–21 °C). For a beer with more "Belgian-y" esters, let the fermentation climb after the first couple days to the mid 70s °F (~24 °C).

but most brewers tend to choose a neutral yeast so that the focus stays on the hops. One particularly useful strategy American brewers have brought to the IPA style is the restrained use of highly fermentable adjuncts (sugar, unmalted starchy adjuncts). If you use 1.0 lb. (0.45 kg) of dried rice extract or corn sugar in a 5-gallon (19-L) batch of IPA in place of 1.0 lb. (0.45 kg) of dried malt extract, it will bring down your final gravity approximately 2 or 3 "gravity points." The effect this has on mouthfeel and perceived maltiness in the final beer is significant. Also, the hops are more obvious and enjoyable with less residual sugar to hide it. (For more on American IPAs — as well as other hoppy beers such as American pale ale and IIPA — see the July-August 2012 issue of *BYO*.)

Black IPA

Black IPA is a style that highlights my point. To turn an IPA black, we get to consider a new group of malts for use. The dark malts and grains — including black malt (sometimes called black patent malt), chocolate malt, Carafa® malts, darkly roasted wheat malts and roasted barley — are roasty and acidic, but can bring great depth of flavor with hints of coffee, chocolate, and even nuttiness. Some brewers try to avoid these flavors altogether while trying to capture only the color from the malt. Use black malt, dehusked Carafa® III malt or malt color extract, if available, if this is your goal. Using around 3 to 5 oz. (85–141 g) of black malt or Carafa® III in 5.0 gallons (19 L) of beer will add roughly 11 to 16 SRM to your color, but little flavor or aroma.

Others allow the dark malt flavors to come through at restrained levels while trying to adapt the other malt, hops and yeast flavors to match. Whichever strategy you attempt, consider some of these ingredients to improve your chances of success.

You will need about 12 oz. to 1.0 lb. (0.34–0.45 kg) of one of these black malts, or a blend, to achieve the desired dark brown to black beer color in a 5.0-gallon (19-L) batch. Be sure to add some chalk (calcium carbonate) to counteract the acidity from the black malts. (1 tsp. per 5 gallons/19 L is a good rule of thumb if your municipal water source is well-suited to pale to moderately amber beers.)

Use "the usual" America-style IPA hops, including Cascade, Columbus, Chinook, Centennial, Amarillo™ and Simcoe®, in this style of beer.

Wheat IPA

My favorite evolution in IPA in the last few years came from Lagunitas Brewing Company. Their Little Sumpin' Sumpin' Ale defies categorization, but I like to think of it as a wheat IPA. The high alcohol and hop profile are similar to an imperial IPA, but the malt base includes a high percentage of wheat. The use of wheat softens the beer significantly, so be sure to avoid the more aggressive bittering hops such as CTZ (Columbus/Tomahawk®/Zeus).

With the soft flavors of wheat in the malt bill and use of clean bittering hops, the beer becomes an incredible stage for hop aromas to dance on. I have done several versions of this style and found that residual sugars decrease the quality of the beer. You don't want the beer to taste syrupy. This is a risk, particularly if you want it strong like an imperial IPA. You want a dry finish and bountiful hops. Avoid high proportions of caramel malts, or even leave them out completely in favor of lightly toasted malts, such as Vienna, Munich or Victory®/biscuit. To lower the final gravity, use highly attenuative yeasts or make use of corn or rice sugar to improve fermentability.

Keep in mind that most wheat beers are approximately 50% wheat

The Future of IPA

When trying to predict the future, it's best to keep two things in mind: 1.) It's very hard and you run the risk of looking like an idiot when it actually arrives, and 2.) It's ridiculously fun. So with that in mind, I'd like to speculate about the future of IPA. We all know the history. It started with uphopped English ales, migrated to the US where the ales got hopped some more and currently the style has spread both "vertically" (to double IPAs) and "horizontally" (to other styles). Where will it go next? It's tempting to drag out the BJCP Guidelines and look for styles that might benefit from an extra layer of lupulin. But let's face it, that idea has pretty much been explored. Hoppy versions of lots of different beer styles — from Scottish ales to hefeweizens — have emerged on the commercial front and I think the odds are overwhelming that homebrewers have added extra hops to every style that could potentially benefit from them, and then some. So where does IPA go from here? I think the real future lies in hop breeding. Hop breeders come out with new varieties every year and the pace of new introductions is accelerating now that craft beers are booming. Many new hop varieties don't add much to the brewer's palette. Breeding new, basically neutral, higher-alpha hops is fairly popular and there will always be a market for the next higher-alpha hop strain with better crop yields. On the other hand, some new hop varieties have interesting new flavors and this is where I think the next epoch of IPAs will come from. Two recently introduced hop varieties, Sorachi Ace and Nelson Sauvin, have brought us new flavors in hop form. (Sorachi Ace has lemon notes and Nelson Sauvin is reputedly reminiscent of the fruity aroma of Sauvignon Blanc). And, I think it's reasonable to assume that other interesting new hop flavors are in development. And, some of these will taste great when their volume is turned up to 11. Also, with new hop flavors comes the possibility of interesting blends. The currently popular American hops have citrusy and sometime resinous characteristics; new hop varieties that mesh well with these flavors and aromas could usher in a whole age of alpha acid awesomeness. It would, of course, be foolhardy to speculate on what specific flavors new hop varieties may possess, so I'll go ahead and do that. It is at least theoretically possible that any plant-derived flavor or aroma could be bred (or genetically engineered) into hops. The flavors or aromas of any fruit, vegetable, flower or any other plant part could emerge in hop form. In addition, once scientists elucidate the pathways that produce existing hop oils and other flavor compounds, these pathways could be engineered to overexpress their products. There could, theoretically, be a "super" version of all our favorite hops in the future — Super Cascade, Super Amarillo™, Super Simcoe®, etc. Hops that just burst with the flavor of their ancestors.

— Chris Colby

and 50% barley. You may want your proportions of barley to be slightly higher than this to retain a bit of backbone. For extract beers, you may want to blend dried wheat malt extract (which is often made from a 50:50 blend of barley and wheat malts) and dried barley malt extract.

Rye IPA

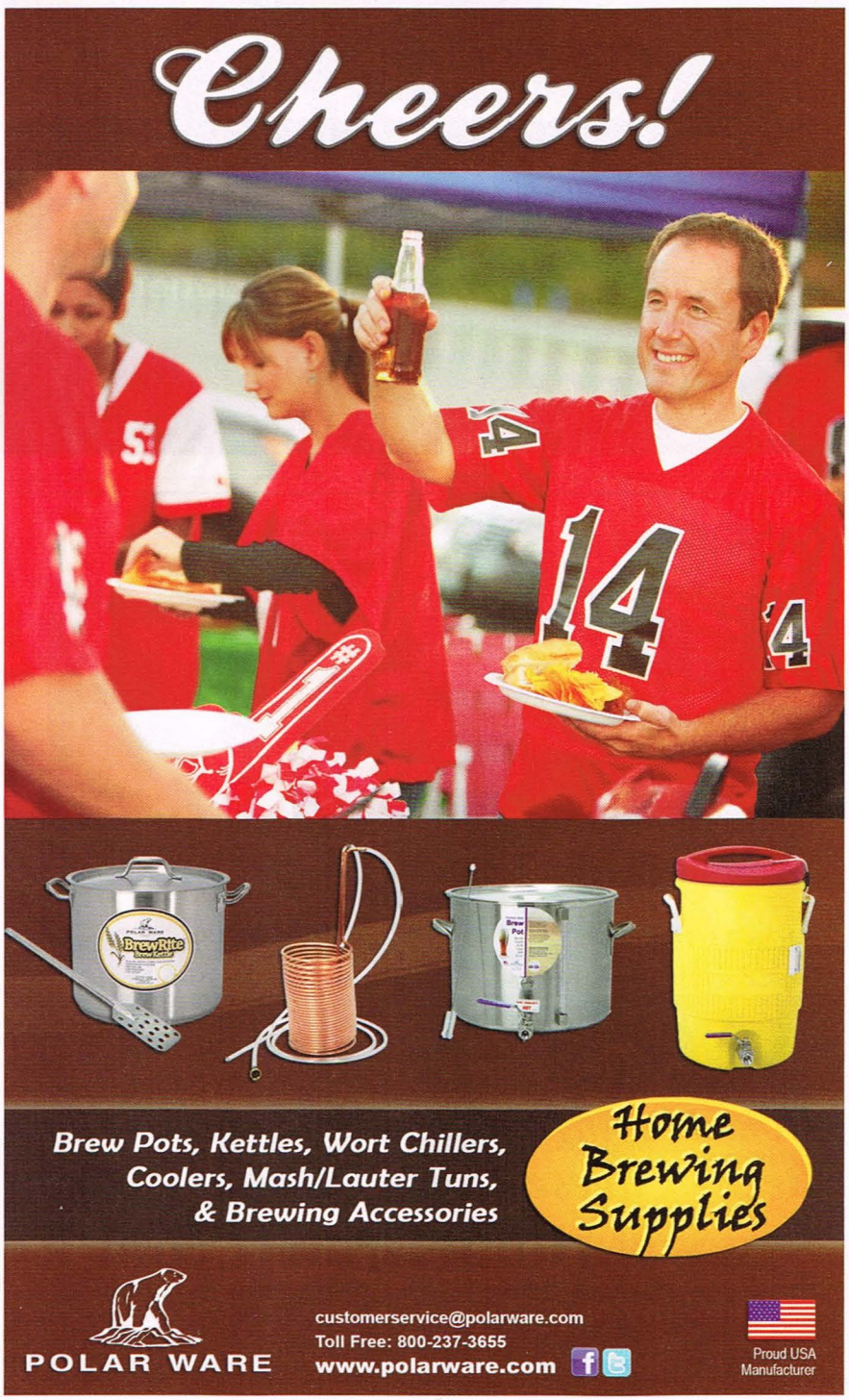
Rye IPA — or rye-P-A as it is sometimes called — takes the style another direction completely. Rye is known to be spicy, and you can echo this character with hop choices. Bear Republic's Hop Rod Rye, for example, brings this spice character to life with their inspiring beer where bready and spicy flavors are married well with aggressive hops and traditional American IPA character. I have found that the spice character of rye, however, is fairly subdued and the malt contributes a smooth slickness to the mouthfeel of the beer. This particular character of rye has been enhanced and brought to life by Sierra Nevada's new beer Ruthless Rye. The bittering hops are soft, flavor hops are resinous and sweet, and aroma hops citrusy and bountiful in true West-Coast style. This gives you two totally different directions to run with a rye IPA. If you want to make a rye-P-A, I suggest first deciding whether you want to try a "spicy" interpretation, or a "smooth" interpretation.

There are two types of rye that homebrewers commonly use — malted rye and flaked rye. Malted rye is the more common choice and the best default choice. Flaked rye will not only add rye flavor and aroma, but it has a higher protein content than malted rye so it will increase your head retention. It sounds trivial, but a creamier, fuller head may be just the dimension you are looking for. If you opt for flaked rye, try 1.0-2.0 lbs. (0.45–0.90 kg) for a 5-gallon (19-L) batch. If you are an extract brewer, be sure to use a mini mash with some 2-row base malt, 6-row malt, or malted rye to ensure sugar conversion. With malted rye, a good start would be to make it about 20% of the grist. Caramel malts can add some body and sweetness to the beer, but don't overdo them. For more spicy interpretations of the style, use more aggressively-flavored hops.

Why Not A Belgian Twist?

Perhaps the trickiest and most adventurous new IPA variant is the Belgian-style IPA. There are few breweries that attempt it, and I have noticed that homebrewers rarely try it more than once. Trying to blend an IPA with a Belgian beer is a bit like trying to blend your favorite white wine with your favorite red wine. But with consideration given to the possible flavor and balance conflicts between these styles, you can succeed.

There are a couple significant logistical challenges when merging the two styles. One is an issue of balance. Belgian beers are unapologetically low-hop beers, while IPAs are aggressively



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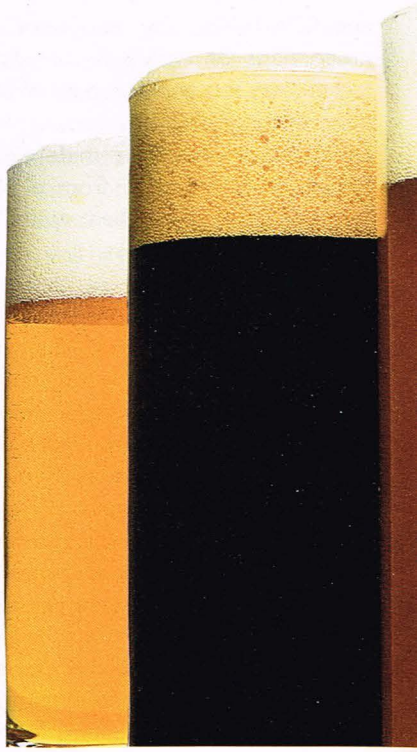

hopped. The low-hop softness of the Belgian tradition is generally a necessary background to the fruity yeasts used — after all, who wants to taste bitter fruit? The other challenge is conditioning. Belgian yeasts produce a high level of metabolic byproducts. These byproducts — such as fruity esters and spicy phenols — may require cold conditioning to subdue, while fresh IPA dry hop aromas deteriorate with aging. My suggestions at handling these challenges are rather simple, and I ran a test at home to verify.

For my test recipe, I took inspiration from the Bohemian Pilsner tradition. These beers are high in IBUs, sometimes above 40, yet the use of soft water and bittering hops that are low in astringency keep the flavor and finish soft. With this in mind, you might try using pure deionized water as I did, with little or no water salt treatment, and aiming for 35 to 45 total IBUs.

To deal with the conditioning issue, you might use the suggestion of Bob Peak at The Beverage People: Leave the beer in secondary for a week before beginning your dry hop additions, and make a second dry hop addition one week after that. The way I dealt with it in my experiment was to make use of a yeast blend — I added a neutral ale

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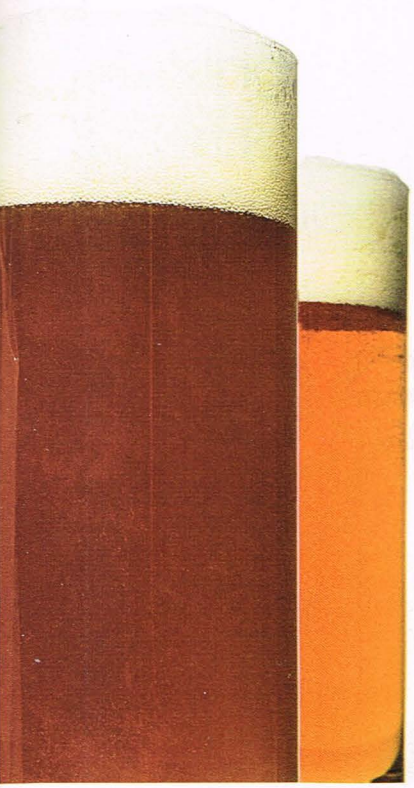

yeast after cooling the wort followed by a Belgian strain as soon as the fermentation was active. I tried two different Belgian strains — White Labs WLP500 (Trappist Ale) and Wyeast 1762 (Belgian Abbey II) — and found the first added a mellow bubblegum character and the second added a grapefruit note. I was particularly fond of the batch with WLP500 because of the bubblegum character and general softness which played a nice background role to the citrusy hops.

Another consideration is which base beer style to use. I recommend a Belgian blonde, though Belgian tripel is popular as well. Both Belgian styles are yellow to gold in color and should have a fairly dry finish. About 1.0 lb. (0.45 kg) of either rocks or liquid sugar in 5 gallons (19 L) will help assure the desirable dry yet sweet finish. Specialty malts to try in this style include Vienna, Caravienne® or aromatic malt. Keep these additions low enough that you don't add too much color or body. Use European hops for bittering and flavor, perhaps accentuated with some American hops for aroma. BYO

This is Gabe Jackson's first BYO *article. He works at The Beverage People in Santa Rosa, California.*

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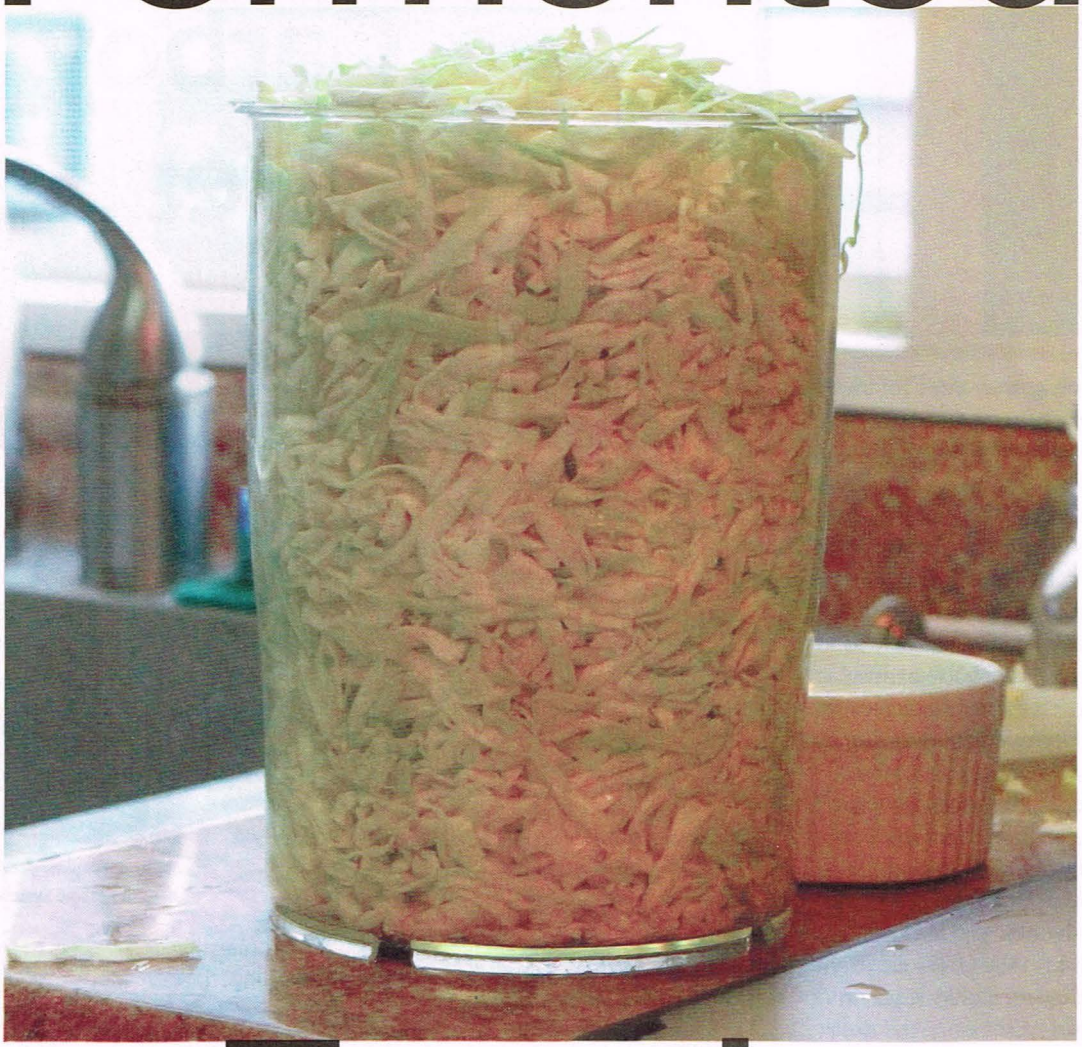
Fermented Foods



Making Sauerkraut, Yogurt, Sourdough Bread, and Malt Vinegar at Home

It may come as a shock to some homebrewers, but beer isn't the only delicious thing that fermentation is responsible for creating. If you already know how to brew beer, it is an easy leap to other alcoholic beverages such as hard cider, wine and mead. In fact, starting a batch of one of these is as easy as making a no-boil extract beer because fruit and honey are loaded with fermentable sugars (unlike starchy grains). There are nuances to the ingredient selection and processes for these beverages to be sure, but their fermentations are nearly identical to beer. On the other hand, as an alternative to making another alcoholic libation, consider fermenting some food to eat alongside a pint of homebrew. Most of the microbes responsible for fermented foods are also found in certain beer styles. *Saccharomyces cerevisiae*, the same species of yeast used to ferment ales, also raises loaves of crusty bread. The *Lactobacillus* that gives Berliner weisse its refreshing lactic acidity is also responsible for creating the tartness and firm texture in a bowl of yogurt. The *Pediococcus* that dominates lactic acid production in lambics, also lowers the pH of traditional salami. The *Acetobacter* that adds sharpness to Flemish reds, given enough time and oxygen, creates the acidity of vinegar. The specific strains of microbes involved in the production of these foods are even added to sour beers by some brewers. In the same way that homebrewing allows us to brew beers that suit our palates and use the ingredients of our choice, home-fermented foods have similar benefits. After you succeed with a basic recipe, consider adding optional ingredients, or developing a house microbial culture. Want to use organic heirloom cabbages in your sauerkraut? Go ahead! You might save a few dollars making yogurt or vinegar at home, but the best reason to ferment at home is the satisfaction of making something for yourself that most people think only comes from a supermarket. This article gives an overview of four fermentations: malt vinegar, sourdough bread, sauerkraut, and yogurt. The recipe section starting on page 50 includes a recipe for each.

> "On the other hand, as an alternative to making another alcoholic libation, consider fermenting some food to eat alongside a pint of homebrew."

Malt Vinegar

In the absence of oxygen, yeast cells generate energy by fermenting sugar into alcohol. Once the yeast ferments all of the chains of carbohydrates short enough for its enzymes to disassemble, its work is finished. This doesn't mean that all of the stored chemical energy has been expended, however; with the availability of oxygen, other microbes can generate energy by converting alcohol into acetic acid. Acetic acid is the primary acid in all types of vinegar. It is the alcoholic base that determines the type of vinegar. Beer is converted to malt vinegar, sake to rice wine vinegar, hard cider to cider vinegar, red wine to red wine vinegar, etc. Most of us occasionally brew a batch of beer that isn't terrible, but isn't good enough to drink proudly. Rather than dumping the beer, convert it into this traditional condiment served with fish and chips.

Sourdough Bread

While most breads (like most beers) are fermented by a single species of yeast, sourdough is the bread equivalent of Belgian lambic. Sourdough is fermented by a combination of wild yeasts and bacteria and consequently

requires a longer fermentation, but the result has a more interesting flavor which includes lactic acid tartness. All bread was made using such a process before bakeries started buying their yeast from breweries. The fermentationist can either start their own sourdough culture, or buy one (although as you propagate and reuse a culture, the microbes from your flour, water, and air will overtake the original microbes).

There are enough ways to create your own sourdough starter to fill an entire article. I began my first starter by combining varied sources of yeast and bacteria (kombucha, sour beer, bread yeast, etc.) with equal parts of flour and water by weight. Leaving the starter at room temperature and feeding it with more flour and water each day for a week brings the microbes to equilibrium and allows you to assess their flavor and carbon dioxide production. My starter produced a good tart flavor, but did not create enough carbon dioxide to inflate the dough in a reasonable amount of time. I threw my starter out and purchased San Francisco sourdough starter from Fermented Treasures (now defunct). I managed to keep that starter alive for several years before eventually letting it die from neglect during a particularly hot DC summer.

> "When you remove some of the starter to bake with, simply replace that amount with equal parts (by weight) flour and carbon-filtered water . . ."

The mixed sourdough culture does not need to be protected from invading microbes like a beer, so no special sanitation procedures are required. Once your starter is ready to use, keep it in the fridge at all times unless you are willing to feed it every day. When you remove some of the starter to bake with, simply replace that amount with equal parts (by weight) flour and carbon-filtered water (the chlorine or chloramines in unfiltered municipal water are added to kill microbes). If you have enough initiative to weigh ingredients when brewing, you should be doing the same for baking (flour is notoriously hard to measure accurate-

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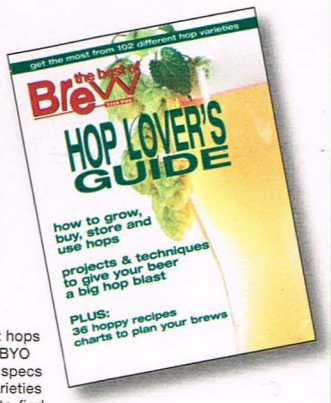

We've collected and updated the best hops information from the past 12 years of BYO and included updated charts with the specs for 102 hop varieties including new varieties and suggested substitutions for hard-to-find hops. We've also detailed different hopping methods, hop growing info, hop-related build-it projects and 36 hoppy recipes. A few of the reasons you will love this new reference...

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ly by volume). If you go more than a week or two between using your starter, discard half of it and then feed with flour and water. If you go too long between feedings, a grayish layer of alcoholic liquid called hooch will pool on the surface of the starter and this should be poured off before using or feeding. Even with such a low-effort recipe you may not want to bake a loaf of bread every week. The major advantage of using an even ratio of water to flour in the starter is that it makes it simple to swap the starter into other recipes in place of packaged yeast. Have a bagel recipe that calls for one pound (450 g) of flour and 12 ounces (340 g) of water? Add two ounces (60 g) of starter and subtract one ounce (30 g) from both the water and flour. How about sourdough pancakes or pretzels? Just extend the fermentation to get the desired amount of rise, but otherwise treat the recipe as you would when using dried baker's yeast.

Sauerkraut

Sauerkraut is one of the easiest fermented foods to make at home. A basic recipe requires only two ingredients, both of which are cheap and available at every supermarket: salt and cabbage. Starting a batch takes less than 20 minutes, and the finished kraut will be ready to eat in just a few weeks. Sauerkraut is one of the only fermentations that has a history in my family. My mother remembers there always being a barrel of fermenting cabbage in the basement of her German grandfather's house. Much like sourdough, sauerkraut is fermented with a mix of microbes which do not need to be cultured or purchased. Salt, in the right ratio, draws moisture out of the cabbage creating brine that protects the desirable lactic acid bacteria (including our friends *Lactobacillus* and *Pediococcus*, in addition to *Leuconostoc*) from other microbes that make

"Sauerkraut is one of the easiest fermented foods to make at home. A basic recipe requires only two ingredients, both of which are cheap . . ."

Continued on page 54

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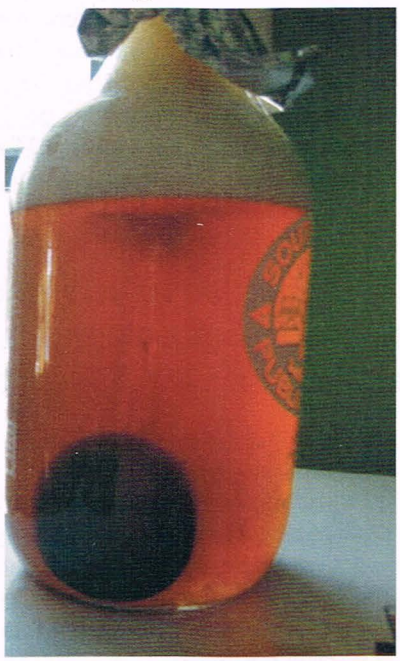
Malt Vinegar



Ingredients

1.5 qts. (1.4 L) of 5% ABV beer

Not all beer styles work well as a vinegar base. The flavor of highly bitter beers, like IPA, can clash with acetic acid. English brown ale results in vinegar closest to the most common malt vinegars on the market, but that is not the only option. Any moderately hopped blonde to dark brown beer will work quite satisfactorily. As a caution if you use a strong beer, water it down to about 5% ABV to avoid having an overly acidic or boozy result.

Step by Step

Pour your beer into a clean growler. *Acetobacter* (the primary bacteria responsible for acetic acid production) is commonly airborne, so making vinegar can be as simple as leaving a three-quarters-full growler of the beer of your choice sitting open in a warm spot for several months. You can speed up the conversion of alcohol to acetic acid by pitching a vinegar "mother." This gelatinous disc is a colony of *Acetobacter* cells that have clumped together by secreting cellulose. A mother can be obtained either from a bottle of unpasteurized vinegar or as a culture sold by some homebrewing stores. Cover the mouth of the growler with cheesecloth secured with a rubber-band to prevent insects from being lured into the aromatic liquid. (Despite the old saying, you can catch quite a few flies with vinegar). *Acetobacter* produces acetic acid rapidly at warm temperatures (85–90 °F, 29–32 °C), but low humidity combined with heat will also lead to faster evaporation. This same evaporation concentrates residual sugars in the alcoholic base and is responsible for the sweetness of traditional Balsamic vinegar.

When the malt vinegar is acidic enough for your tastes (usually after several months), move it to a bottle and spritz onto fish and chips, flavor sauerbraten, make mustard, or mix with oil for a vinaigrette. When you harvest the vinegar, you can either top-off with more beer or transfer the mother to another alcoholic beverage to create a different type of vinegar.

No-Knead To Worry Sourdough

Ingredients

15 oz. (425 g) bread flour
(about 3 cups measured with the scoop and sweep method)
1.5 tsp. (7 mL) kosher salt
11 oz. (0.325 L) filtered/bottled water at 95 °F (35 °C)
4.0 oz. (113 g) sourdough starter

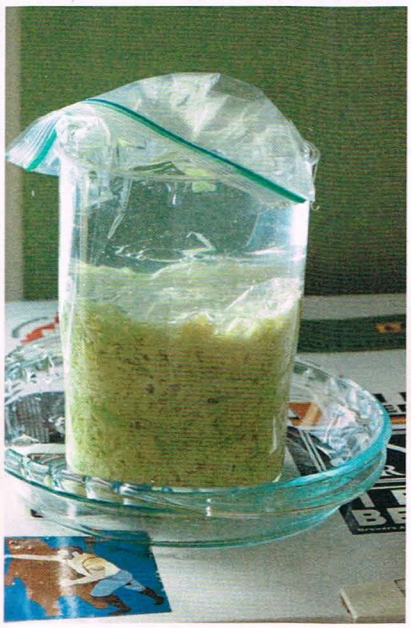
Step by Step

Mix the salt with the flour in one bowl and the sourdough starter with the warm water in another. Combine the contents of the two bowls and mix vigorously for 20 seconds or until all of the flour is moistened. The longer you work the dough at this stage, the more even the crumb structure of the finished loaf will be. If you want a rustic loaf with some big air pockets (like I do), work it as little as possible. Cover your bowl first with plastic wrap and then a clean kitchen hand towel, then leave the dough to rise at cool room temperature overnight (about 18 hours). The expanding bubbles of carbon dioxide will do the work of kneading for you. The long rise also allows the acid-producing bacteria time to create the sourness that defines sourdough.

The next day, dust the dough with a bit more flour and fold the sides into the middle to form a round loaf. At this point the dough should be soft and slightly sticky, but it should hold its shape without sagging. Sprinkle half of a clean tea towel with stone ground cornmeal (other options include wheat bran, seeds and coarse salt) and place the loaf onto the towel seam-side-down. Dust more cornmeal on top of the loaf before folding the towel to cover. The cornmeal prevents the dough from sticking to the towel and helps to enhance the flavor and appearance of the crust. Let the loaf rise until doubled in size again (about three hours for my culture). When your target size is about a half hour away, put a cast iron Dutch oven with its lid into your cold oven and set for 425 °F (218 °C). An enamel coated Dutch oven will transfer heat more slowly, so set the oven to 450 °F (232 °C) if you are using one. When the Dutch oven is rocket hot, place (or toss as gently as possible) the dough, seam-side-up, into the Dutch oven and replace the lid. Bake for 25 minutes. During this time, the lid will trap steam evaporating from the dough. The increased humidity allows the crust to stay pliable as the heat causes trapped gas bubbles to expand and the yeast to go hyper ("oven spring"). After this initial period, remove the lid and increase the oven temperature by 50 °F (10 °C). Take the loaf out of the oven once it is brown and crusty, usually 15 to 20 minutes (or until the internal temperature reaches 206–210 °F/97–99 °C). Don't worry if your bread doesn't get incredibly brown; the lower pH of sourdough slows the Maillard reactions responsible for color development. Place

the loaf on a cooling rack for at least 30 minutes before cutting into it. The crust on this bread is better than on any other bread I have baked, crunchy and flavorful. The acid in the dough helps the interior of the loaf to stay relatively soft for 48 hours or longer if wrapped tightly. Sadly, wrapping tightly also causes the crust to lose its crunch after a day.

Sauerkraut



Ingredients

4.0 lbs. (1.8 kg) sliced green cabbage
1.6 oz. (45 g) kosher salt

Sauerkraut was produced successfully for centuries before there was an understanding of sanitary procedures. However, it is safest to limit the microbes to those living on the cabbage itself.

I use Star-San to sanitize anything that touches the cabbage, including the knife, v-slicer, container, cutting board, and weight.

Step by Step

Discard any ugly/dirty outer leaves and then quarter the cabbage through the root end. Slice each quarter into whatever thickness you desire, usually between an eighth and a quarter of an inch (3–6 mm). Using a v-slicer, mandolin or food processor slicing blade makes quick work of the task and ensures a consistent texture compared to chopping with a knife. Two medium heads of green cabbage yield three to four pounds once shredded. Mix the cabbage with 2.5% of its own weight in kosher salt (measuring by weight removes inaccuracies associated with volumetric measures). Press the salted cabbage into a large non-reactive (plastic, glass, stainless steel, or ceramic) container.

Earthenware crocks are traditional, but not necessary. Initially, the vessel can be filled to the brim with cabbage, which will compact as it releases water. Over the next few hours the salt will draw out moisture. When the cabbage looks wilted, press on it and place a lid from another container that is small enough to sit on the surface of the cabbage. Position a one pound (0.45 kg) weight, such as a water-filled mason jar, on the lid to press the cabbage. Alternatively, fill a sturdy, sanitized Ziploc bag with water to use in place of both the lid and weight. Leave your souring kraut at cellar temperature, around 60 °F (16 °C), to ferment. After 24 hours the liquid coaxed out by the salt and weight should be enough to cover the surface of the cabbage. Drier cabbage or an inadequate weight may prevent enough liquid from being exuded. If the liquid does not cover the cabbage, top-off with brine made by mixing chlorine-free water with 2.5% salt by weight. By 72 hours the cabbage should start emitting gas bubbles and a light sulfur aroma, which is why many people store their fermenting kraut in a basement or spare bathroom. I actually enjoy young salted cabbage that has just started to ferment as a side-dish for grilled meat and on sausage sandwiches. As the fermentation continues, you may notice colonies of (non-dangerous) mold floating on the surface of the brine. If you do, scoop them off, clean and sanitize the lid and weight before returning. After two to three weeks, the distinct tart smell of sauerkraut should be apparent. Taste the sauerkraut once a week until the flavor and texture are at your desired level. At this point, move the sauerkraut and brine to a mason jar or other airtight container and refrigerate until consumed. Spices (juniper, caraway), fruits (apples),

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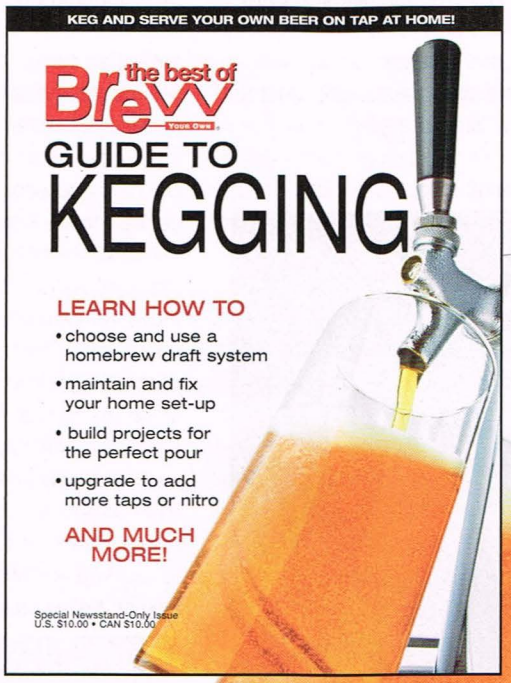

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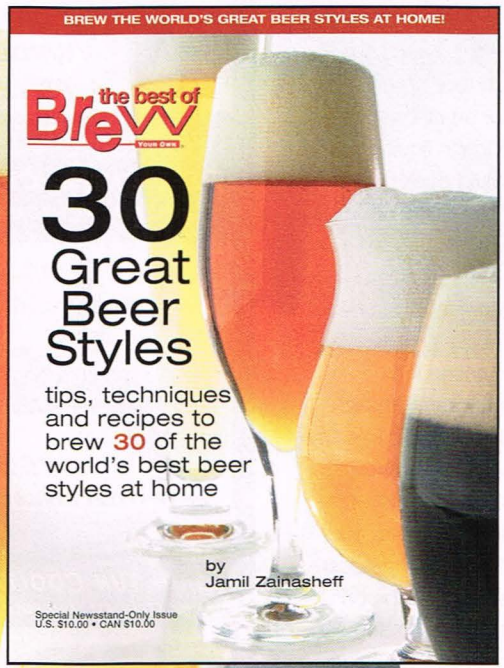

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or vegetables (onions) can be mixed into the cabbage along with the salt for added flavor or texture.

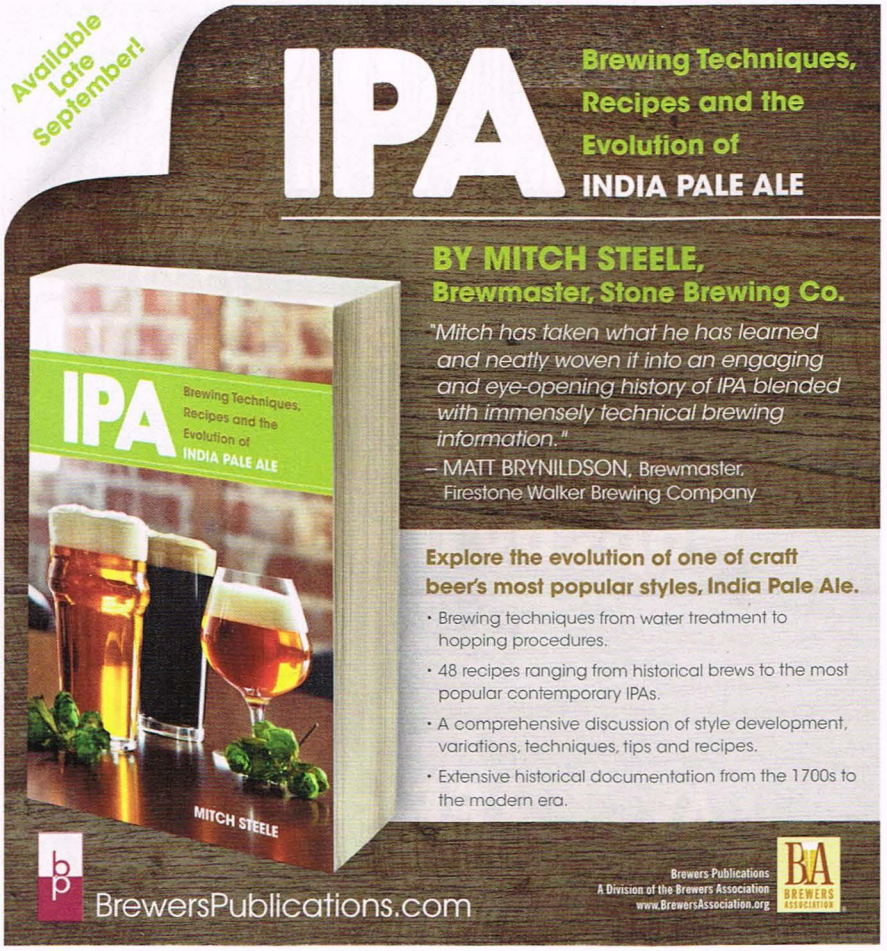
Yogurt

Ingredients

½ gallon (2 L) milk
1 oz. (16 mL) yogurt
(with live cultures)
You can use milk from any animal and with any percentage of fat you want.

Step by Step

Stirring constantly, heat the milk to 185 °F (85 °C). The longer you hold the milk at this temperature (up to 30 minutes), the firmer the texture will be. Allow the milk to cool to 115 °F (46 °C); a cold water bath will speed up the process. Pour all of the milk, except about a cup (250 mL), into clean non-reactive containers (old quart/liter yogurt containers are perfect). Stir the reserved cup of warm milk with the room temperature store bought yogurt. Mix the thinned yogurt into the rest of the warm milk, and then adjust the thermostat to the required setting. Fermentation by *Lactobacillus* in their ideal temperature range is rapid. About eight hours will usually result in a mostly firm, thick, tangy yogurt. The longer you leave the yogurt before putting it into the refrigerator the more acid will be produced, and the firmer the resulting yogurt will be. Commercial yogurts often contain stabilizers (such as pectin) which firm the texture and preserve the consistency when stirred. If you like firm yogurt, add a few tablespoons of powdered milk before heating to increase the protein content. If you prefer Greek-style yogurt, then place your fermented yogurt in a strainer lined with cheesecloth to drain some of the whey.



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unpleasant flavors. As a result, it is not advisable to reduce the amount of salt in the recipe. If the finished sauerkraut is too salty for your tastes, rinse it before eating or cooking.

Yogurt

Dairy products are the most diverse areas of fermentation. They include such standards as sour cream and buttermilk; gourmet items like crème fraîche, cultured butter, and kefir; not to mention countless varieties of cheese. Out of all of these the most common and easiest to make is yogurt. Starting a yogurt fermentation requires the introduction of the right bacteria, but luckily they are available at your supermarket in any commercial yogurt that indicates it "contains live cultures." For subsequent batches you can use homemade yogurt, instead of commercial, to provide the microbes. *Lactobacillus* is responsible for both the tart flavor, and the thick texture of yogurt. The thickening is a result of protein coagulation brought on by the lactic acid-lowered pH. Before making your first batch, you will need to find a method to keep the fermentation between 110 and 115 °F (43–46 °C). Purpose-built yogurt makers are available, often for a few dollars at thrift shops. I use a cooler and an old heating pad that does not have an automatic shut-off. If you MacGyver your own rig, test it with water first to determine the ideal temperature setting. At warm temperatures the fermentation is so quick that you do not need to worry about the milk spoiling, so clean

your equipment, but sanitation is not necessary.

Fermented Finish

Many beer nerds are foodies, and most of the homebrewers I know are also passionate home cooks. Once you get started with these simple recipes, there are a multitude of fermented foods out there that take more time, effort, and precision. Homemade yogurt may lead you to cheesemaking. Cured and fermented meats can be marvelous, but also require precise temperature and humidity controls. There are also many things that can be made by fermenting soy beans (e.g., soy sauce, and tofu). Also worth investigating are low-alcohol fermented beverages like ginger beer plant, kombucha, and kvass (a subject Nathan Zeender and I wrote about in the December 2010 issue of *BYO*). Whatever you ferment, take good notes, and learn from both your mistakes and your successes. BYO

Michael Tonsmeire wrote about spontaneously fermented beer in the September 2012 issue of Brew Your Own *magazine.*

For more on fermented foods, see:
"200 Easy Homemade Cheese Recipes: From Cheddar and Brie to Butter and Yogurt" by Debra Amrein-Boyes (2009, Robert Rose)

"Wild Fermentation: The Flavor, Nutrition, and Craft of Live-Culture Foods" by Sandor Ellix Katz (2003, Chelsea Green)

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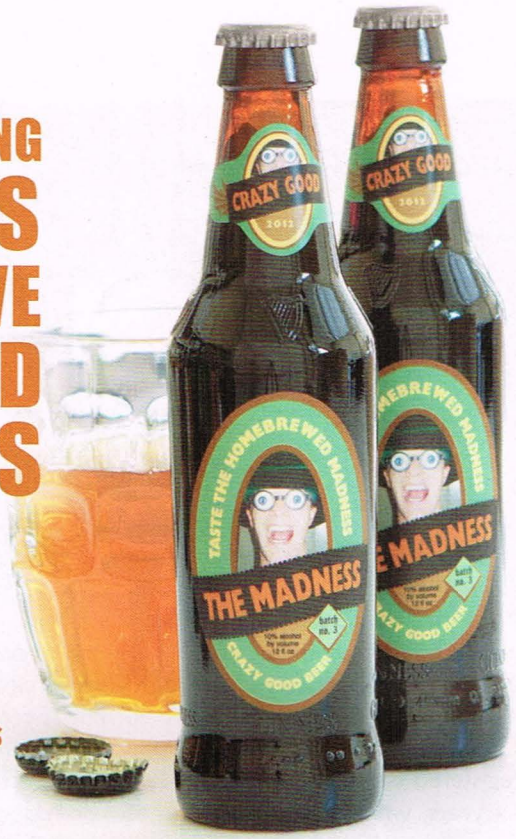

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BEHIND the SCENES AT Homebrew Competitions

It's no understatement to say that these are boom times for homebrewing with the number of US homebrewers now currently estimated to be over one million. The growth in homebrewing is also fueling an increase in the number and size of competitions. The Beer Judge Certification Program (BJCP) reports the number of registered competitions has more than doubled in the last six years, while the number of entries per competition has also increased. With all the new brewers and interest in competitions, many wonder how competitions actually operate and how they might host one of their own.

How Competitions Operate

Most homebrewers don't get to see how competitions work unless they are judges or competition staff. But even then, all the preparation work is a big unknown unless you've actually been involved in the process. Let me first describe the mechanics of a competition from the entering and judging perspective before turning to the secrets only competition organizers know.

Homebrew judges assess the beers entered in the 2012 Beer and Sweat homebrew competition in Cincinnati, Ohio.

Brewers enter a competition by registering their beers with a competition, which is typically done online. The entrant must decide how to categorize and describe their beer, which usually means identifying a subcategory from the BJCP Style Guidelines, and possibly including additional information that helps judges properly evaluate your beer (like saying what's special about your experimental beer). During the registration process, beers are typically assigned an entry number to ensure blind judging.

Once registration closes, competition organizers take the entry information and organize the beers into judging categories. Depending on the number of entries and judges, individual style categories may be judged by themselves, be grouped with other styles or be split into multiple flights.

Judging panels normally consist of two or three judges, some of which should be BJCP judges. (The ideal is to have all BJCP judges, but this is often not possible). Competition organizers like to put BJCP judges on all panels, normally so that higher-ranked judges are spread around as much as possible. If a competition can't draw enough BJCP judges, they may use whoever they can find that claims they can judge beer. Hopefully, these people will be brewers or at least beer aficionados, but it's up to the competition organizer and judge director to decide who is seated as a judge.

Judges are given information about their flight by the organizer. They normally are told the entry number, the style of beer (BJCP subcategory, typically), and any special information provided by the brewer. Judges decide the order in which beers will be judged, but they tend to follow the ordering of subcategories in the BJCP Style Guidelines.

Judges taste the beers and fill out scoresheets, assigning a consensus score to each beer. They repeat this for every beer in their flight, then they select the top three beers for medal purposes, and send the top-ranked beer to the next

Story and Photos by **Gordon Strong**

BEER
SWEA
BELGIAN
STRONG ALES

round (typically, the best-of-show panel). Beers are judged against the criteria in the style guidelines, and are evaluated for style fidelity and technical merit.

If a competition category is judged by multiple judging panels, then a mini-BOS (best-of-show) is used to select the winners from the combined flights. Categories with a single panel directly award winners. In a mini-BOS, the top beers from each panel are judged again, this time without scoresheets. The senior judges from the category simply select the top three beers from those passed along to the mini-BOS table. These judges do not see the preliminary scores or rankings.

In some larger competitions, there may be a second round of judging, as opposed to mini-BOS panels. This is usually done without scoresheets, but exceptions exist.

During the best-of-show round, the top beers from each panel are judged again. Scoresheets are not prepared during BOS judging, and preliminary scores are not provided. Judges typically kick out beers one by one until they have a small number left, then discuss the relative merits of each and pick the best one for overall winner. Awards are presented to the category winners and overall champion.

Planning a Competition

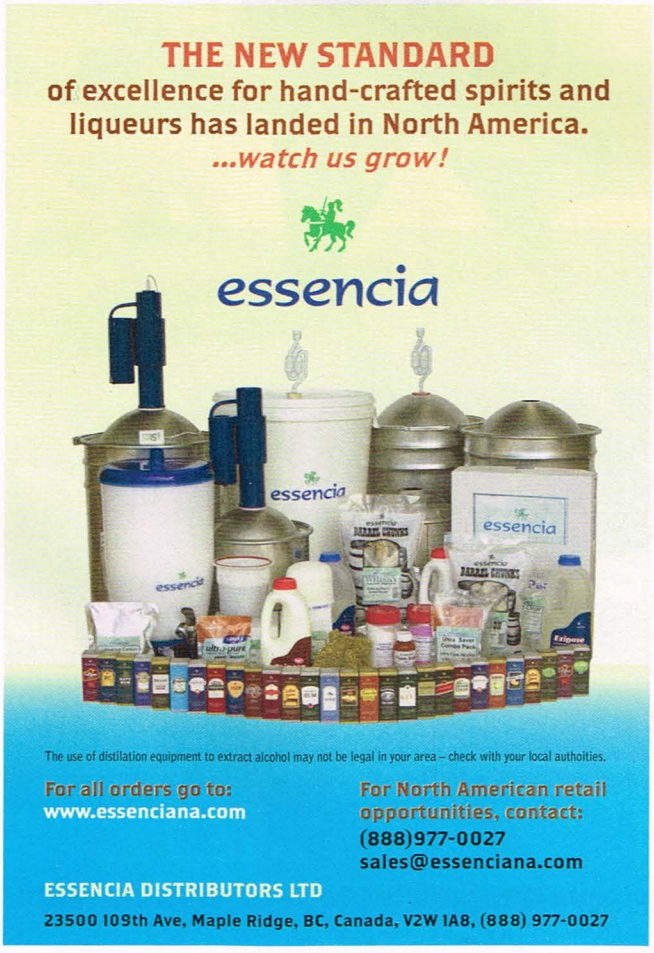
In successful competitions, a lot of work goes on in planning and preparing for a competition before the beers are actually judged.

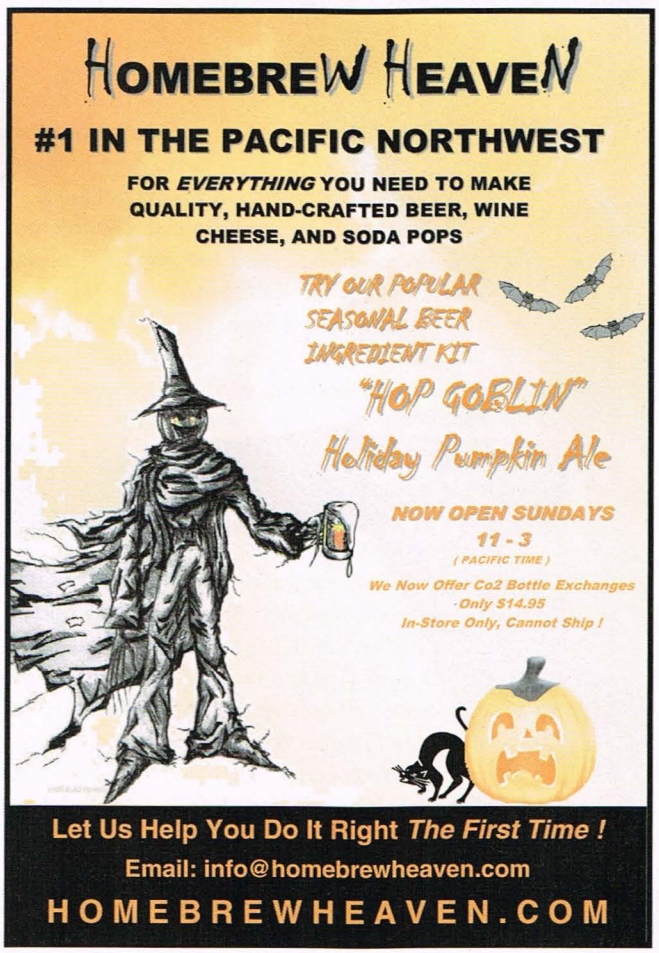
A quote attributed to famous military leaders from Napoleon to Omar Bradley sums it up: "Amateurs study tactics, while professionals study logistics." This quote applies to homebrewing competitions as well, especially those that are sizeable. If you think of the competition as a way to get all the various beers moved through the judging process in good order, then you've got a good start.

I like to break up a competition into specific phases: planning, registration, handling entries, judging and close-out. Some of these phases may overlap, but each has unique tasks to solve. The first year a competition is held may require some additional planning, including determining state and local laws that may apply to the contest.

In the planning phase, you should first identify the essential staff, which you can think of as the competition committee. Designate individuals as the organizer, the registrar, the judge director and the head steward. In smaller competitions, some of these jobs can be combined. In larger competitions, the key staff members may need assistants.

The organizer must set the name and date for the competition, select a proper venue that can handle the event, register the competition with the BJCP, advertise the competition, set up competition guidelines, order awards, procure raffle prizes (if used), field questions and oversee task com-





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The 267 kegs of homebrew submitted to the 2012 Beer and Sweat keg-only competition in Cincinnati, Ohio, run by the Bloatarian Brewing League. Most contests only accept bottles.

pletion of staff members. In larger competitions, some of these tasks will be delegated. I've seen very large competitions where the organizer is essentially a project manager who only tracks assignments and completion of tasks. A person with project management skills often does well in this job.

The registrar will maintain the database of entries registered, track payments, check in entries, and record results. This person may be an IT person who can set up an online registration system or database, or may get additional help. It is critical that this person not judge, since they will have access to entry information. Any others who can associate entries with entrants should also not judge.

The judge director is responsible for recruiting judges (the BJCP supplies a list of regional judges when the competition is registered), creating judging flights and assigning judges to categories. During the competition, the judge director handles issues related to judging, shifts judges around if necessary due to no-shows or conflicts, and determines judge eligibility for the best-of-show round.

The head steward recruits, trains and assigns stewards to various competition tasks, including setting up the room for judging, making sure tables are properly set, ensuring entries are properly sorted for the table and making sure the judging paperwork is handled correctly by the judges and returned to the registrar afterwards.

The people on the core team will work together during the planning phase and competition; good communication skills are essential. Other members will be recruited for the team to cover particular duties through the competition, such as handling the cellaring duties.

Key things to consider when selecting a competition site include the size of the available space, amenities, price and the ability to bring homebrew onto the premises.

Cold storage for entries is necessary, and can be handled via refrigerated space on-site, rental refrigerated trucks or a series of large coolers. Think about how judges and the entries will get on-site. How easy is it to load and unload large items (cases and cases of beer)? Can judges park easily or reach it via public transportation? Is the space available for the full time of the competition? Will it be shared with other events? Understand that judges should be in a quiet, well-lit room that is free of strong odors. The facility should also have ample tables and chairs for the judges; you will need to know how many categories will be judged simultaneously and how many judges will be present in order to estimate the space.

Try to have the cold storage space (where beers are kept prior to judging) as nearby the actual judging room as possible – this will make it much easier on the stewards. Note that the cold storage space on-site for the competition may be different from where the beers are received. Beers dropped off or mailed-in before the judging date need to be stored cold as well.

Finally, consider the transport issue between storage and competition sites. How will the beers be moved? How many people and vehicles are needed? Strive to minimize jostling and heating of the entries.

The judging space should also have access to clean drinking water, or bottled water must be brought in. The ability to dispose of old entries and competition materials is also necessary. A homebrewing competition can generate a lot of waste when you consider all the judging supplies and entries consumed. Make sure the location has adequate and accessible restrooms for the number of beer judges and other staff expected.

Other considerations for a judging

location are the restaurant facilities, if food will be purchased on-site. In private locations, food will have to be brought in. Judges will be expecting food before they judge. They may want to enjoy craft beer after judging is over, so also consider whether beer will be available to them. The better the experience for the judges, the easier it will be to recruit them.

Plan to register your competition at least 60 days in advance with the BJCP. This will allow time to have it shown on the BJCP and AHA competition calendars. This is the most basic of publicity. Most competitions do much more, such as posting on online forums, sending emails to regional clubs, posting flyers at local homebrew stores and making announcements at other competitions.

Each competition will have its own special rules, although most are very similar. Consider whether you want to have any special judging categories, or if you will just use the BJCP Style Guidelines. Will you accept all styles, including mead and cider? Do you have judges qualified to evaluate all of them?

Some decisions to make in setting your competition rules include:

*eligibility
(state residents or club members only, must be made on homebrew system, etc.)
*number of bottles per entry
(generally two or three)
*bottle sizes accepted
(oversized bottles are harder to sort and stack in case boxes; you may accept draft beer in kegs or other containers)
*entry fees
(most competitions charge $5-10 an entry)
*entry deadline
(how far in advance of the competition, to allow for sorting)
*whether late or walk-in entries will be accepted
(some competitions allow out-of-town judges to bring their own entries)

The registration process involves collecting information you need from the entrants and judges, collecting payments, and feeding this information into the databases or competition software you will be using to manage the competition. Most entrants today expect online registration software that has a decent user experience, and most also will expect to provide online payment. Anything paper-based will likely limit your entries rather than increase them, and it will definitely cause more work for your staff.

The best systems will handle both the registration of entries and judges/stewards. If you are building your own system, remember to capture all data you need to have for the competition, including the brewer's name and contact information, and all pertinent information that judges need

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to know about the entry. It does no good if this information is collected and not passed along to judges, so if the brewer provides supplemental information, be sure judges see it.

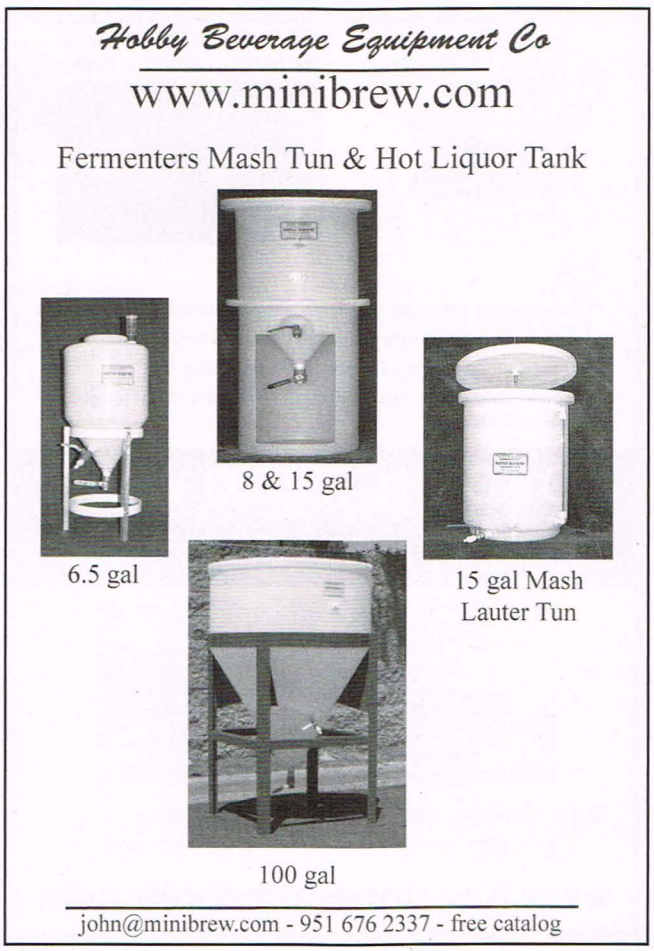
The same registration software may also provide competition management features, such as assigning beers to flights, assigning judges to flights, recording scores, and printing out results. If these are separate systems, it is important that data collected by the registration system be transferred to the competition management system. Lists of potential BJCP judges will be provided to the organizer; many systems import this data as well. Several systems will also prepare the organizer's report for submission to the BJCP. If not, the online reporting system used by the BJCP is web-based and easy to use. Competition management software may also assist in formatting address labels, creating pull or flight sheets, printing best of show lists, and other such tasks. The BJCP website (bjcp.org) has links to downloadable competition management software. Some larger competitions have developed their own software.

When creating labels for the entries, consider whether you want to expose the entry number to the entrant. Since homebrew competitions are anonymous, you don't necessarily want the entrant to know their entry numbers (particularly if they are judges or staff). Your software may assign temporary entry numbers so the beers may be tracked during submission, but then use different numbers in the competition. If you do renumber entries, understand that this could be a potential cause for confusion.

The process of handling entries is often the most time- and labor-intensive part of the competition, and should not be underestimated. Most competitions will have a shipping window, or a timeframe when entries are accepted. Make sure there is cold storage at the facility to store the boxes as they are received, and ample room for unpacking and disposing of packing materials. Entries may be unpacked as they are received, but then they will have to be stored until sorting occurs. This helps save space, but can result in the beers being handled (and potentially mishandled) an extra time.

If entries are unpacked before they are labeled and sorted, it is critical that the packages be checked thoroughly before discarding. You may need to separate out any forms or payments, and to check that no bottles were broken or missing. Any exceptions need to be noted; for instance, if a bottle breaks, there may still be time for the entrant to send a replacement.

Breaking down and discarding packing materials is a messy job, and takes more space than you'd think. Check with the storage location; they might recycle some materials or otherwise have rules for disposing of packing materials (such as breaking down or flattening cardboard boxes).



Entrants: Do us all a favor, and please don't use packing peanuts; they stick to everything.

Decide how you want to sort the bottles. Most competitions will sort by judging category, so that it will be easier on the day of judging to select the right bottles. If multiple bottles are required for your competition, decide if you want to keep all bottles together or in different boxes. Coordinate with the head steward to decide what will be easiest for judging. When a beer wins a flight or category, it is important to be able to quickly find the extra bottles for mini-BOS or BOS.

When bottles are sorted, any identification of the brewer is typically removed and a competition-specific label is attached. In some cases, this is just the entry number, but some competitions print custom labels that also include the flight number and entry category. This is a critical phase, and where it is easy to lose track of an entry. Make sure the bottles are identified properly for competition purposes.

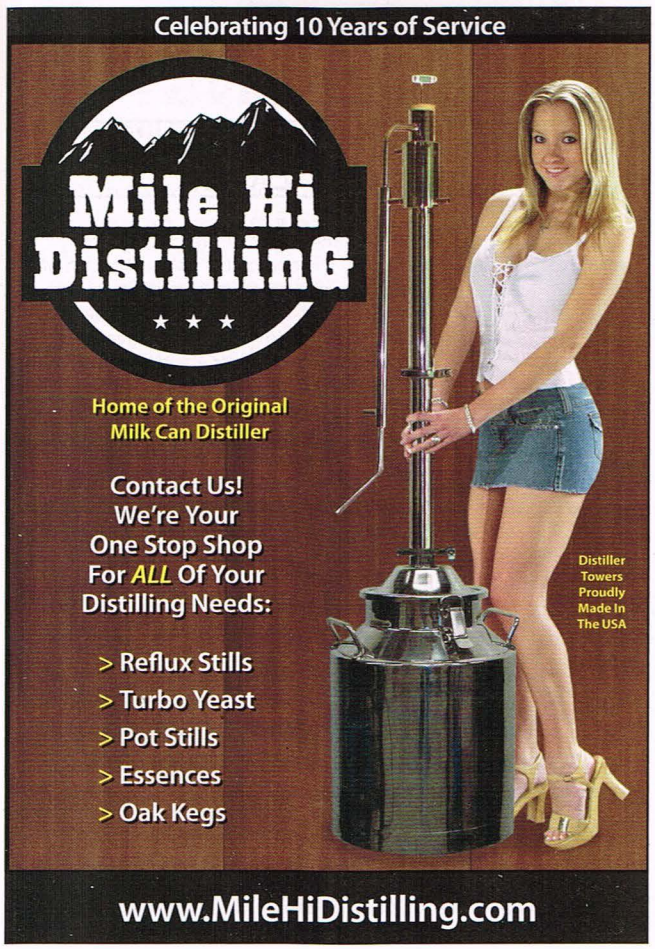
If your competition will be judged in multiple sessions, it is often helpful to divide the sorted boxes into session groups. That way, all the beers for one judging session will be held together. If you have limited storage space or transport capacity, this allows you to bring out the beers for one session while keeping the others in reserve. It will certainly make it easier to find entries since the entire group of beers does not need to be searched.

If you have to make a decision about storing beer, try to make it easy to find and retrieve. If you optimize the process to make it easier for the cellar crew and stewards to find beers on the day of competition, you will go a long way to making the competition itself run smoothly.

Activities performed during the judging phase are described in the "How Competitions Operate" section on page 56. In addition to the judging tasks, all other day-of-competition duties must be performed on-site. In large competitions, make sure you reserve some staff time to troubleshoot problems and answer questions as they arise.

In the closeout phase, all the final duties of the competition are handled. Scoresheets are sorted and returned to the entrants, including any prizes or awards won. It can save you money if you can have this done during the competition so on-site entrants can just pick up their sheets and awards. (Of course, some larger competitions run a closed competition, then give their awards at a later ceremony.)

The judging room must be cleaned up and returned to its original condition (very important if you want to be invited back next year). The judges, stewards and staff receive experience points from the BJCP for their work; the organizer or judge director must report this data to the BJCP using an online reporting system (also found at the BJCP website).



Common Misconceptions

Over the years, I've heard many wild-eyed conspiracy theories from homebrewers who aren't involved in running competitions or judging. Let me debunk them now:

"That guy won; it must be fixed." — I've heard this a lot over the years. BJCP-registered competitions use blind judging. Judges have no idea who has entered and only sees an entry number and a style category. If someone beat you, it's because they brewed better beer, not because people cheated. Judging can be fairly subjective, and some people will have good days. Making good beer improves your chances.

"He won because he judges his own beer." — Again, this is expressly against BJCP rules. Rarely judges might be seated in a category they entered, but I've always seen the judge immediately request to be put into another category. Other judges will know who judged that category, and would raise that issue with the organizer, likely resulting in a disqualification.

"I had the highest score; how come I didn't win?" — In competition categories judged by multiple panels, a mini-BOS resolves who wins. Beers are not typically rescored. Since judging can be subjective and beers can vary bottle-by-bottle, the new panel might reach a different result.

"If I average my scores, it's a different number than I got." — Judges do not have to average scores to reach a consensus score. Each individual scoresheet will stand on its own, and the cover sheet should show the consensus score assigned by the judges. It's often the average score, but not always.

After having judged more than 200 competitions in my career, I can report that virtually all competitions are run by well-meaning people who want to do the right thing. If you do encounter the rare exception, be sure to tell the organizer your concerns. If they aren't resolved to your satisfaction, do not enter that competition in the future.

If you're an organizer and your judges and entrants complain, please take their concerns seriously. We run a largely self-policing hobby, and peer pressure does much more than anything else to help keep us in line.

If you'd like to know even more about homebrew competitions, volunteering to work as a steward (or judge) at a local competition is the right way to go about it. BYO

Gordon Strong is the current president and Mid-Atlantic representative of the BJCP and a Grand Master Level V Beer Judge. He is a frequent contributor to Brew Your Own.

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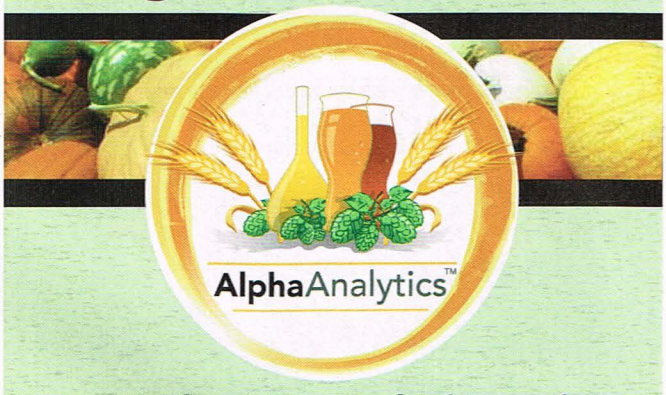

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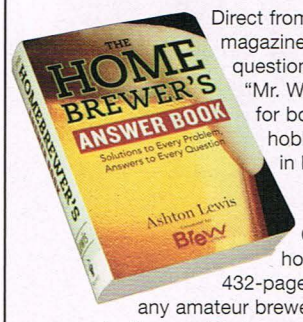

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Brewing In A Bag

Easy all-grain

by Terry Foster

Your first thought on this term might be that this is the simplest form of brewing possible. Perhaps something like open the bag, sprinkle in fairy dust and drink the beer? But what the title of this issue's column really refers to is a simple, equipment-light method for brewing all-grain beers. In essence you simply add all the brewing water to your boiling kettle and bring it to the right temperature either on the stove or (preferably) with a propane burner. Then you add the crushed grain held in a sturdy coarse mesh bag, stir well and adjust the mash temperature, let it sit for one hour until finished and remove the bag, allowing it to drain into the kettle. All you have to do then is add the hops to the wort, boil, cool and ferment in the usual way.

Pros

The first great advantage of this technique is that the "traditional" set-up for all-grain brewing of hot liquor tank, mash tun and boil kettle is no longer required, and the sparging step has been eliminated. You need only one kettle. You can also buy a suitable bag for about $5 from a homebrew supplier. And apart from the cost there is an obvious saving in space required for the setup. Since you do not have to carry out a sparging step the whole process may also take less time than the normal all-grain procedure. As such the method offers a good way to venture into all-grain brewing, and if you like the beer it produces you can always upgrade your equipment later, as wallet and space demands allow.

Another perk is that you don't have to worry about a stuck mash tun with this method, so you can mill your grain more aggressively to get better efficiency.

Cons

Since all the brewing water must be added at the start, you need a kettle big enough to handle this. How big? Well, if you want to make a 5 US gallon (19 L) brew, you need to collect around 6 US gallons (23 L) of wort, assuming that about 1 US gallon (3.8 L) will be lost in the boil. The grain will retain between 1 and 2 gallons (2.8 to 7.6 L) of liquor, depending upon how much grain you are using and on how well the bag is drained. That means a volume of at least 8 gallons (30 L), so that when you add in the grain, you will need a kettle with more than 10 gallons (38 L), and most protagonists of the method advocate a 15-gallon (57-L) kettle.

Then there is the question of brewhouse efficiency. As you do not sparge, the liquor held in the grain is actually wort. That means there is some loss in yield compared to the more normal mash/sparge method. Just how much you lose will depend upon how well you can drain and squeeze the bag after mashing. Some users suggest that this loss is only around 5% over normal mashing, and can easily be allowed for by increasing the total grain bill by 5% — a trivial increase in cost. But it does mean that you must check the wort gravity before adding the hops. That way, if you get a lower gravity than you aimed for, you can reduce the quantity of bittering hops and keep the beer balanced. Don't be afraid of the calculation it is just a simple proportional change. Keep in mind that the collected wort has a greater volume than the finished wort, though.

So, suppose your recipe called for an original gravity (OG) of 1.050, and you collected 6 US gallons (23 L) at 1.037 and you expected to lose 1 gallon (3.8 L) in the boil. Then your OG at 5 gallons (19 L) would be (37 x 6)/5 = 1.044, and you are (6/50) x 100 = 12% below target. So simply add 12% (or about ⅛) less bittering hops at the start of the boil. Of course, if you are making multiple additions of hops at various intervals bittering calculations become much more complicated than

> "A simple, equipment-light method for brewing all-grain beers."

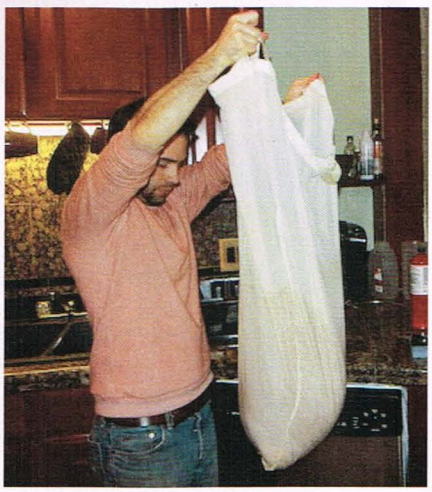

Photo courtesy of Billy Broas

I can deal with here. Also, don't be worried about adjusting the amount of hops called for at the end of the boil — their effect on bitterness is relatively small and decreasing them by one-eighth will not have a noticeable effect on bittering, but may give less hop character than you wanted.

There is another question you may be wondering: will you get good conversion of the starch to fermentable sugars, given that you shall be using a much thinner mash than is normal? The standard method of infusion mashing requires about 1.3 qts. (1.2 L) of water per lb. of grain. But in the bag method let's assume we are using about 10 lb. (4.5 kg) of grain and adding 8 gallons (30 L) of water; that is 32/10 = 3.2 qts. (3.0 L) water per lb. (0.45 kg) of grain, or just about three times as much as in the standard method. Now that is a big difference numerically, and it will affect the conversion. The normal thick mash tends to result in a higher level of non-fermentables in the wort, whereas as a thin mash results in a more complete conversion of starch to fermentable sugars. In other words beer from the thick wort will have more body or mouthfeel than that from the thinner wort. But the amylase enzymes themselves are degraded faster in a thinner mash, so the exact effect of using such a thin mash is one that you will have to work out for yourself. If the first beer you make this way is too thin tasting, then add, say, an extra ½ to 1 lb. (0.23 to 0.45 kg) of crystal/caramel malt, Special B or Victory® malt which will give some non-fermentables to the beer and boost its body. Simply increasing the mash temperature a couple of degrees, as is often done with thick mashes may also help, but be careful as higher mash temperatures can result in a more rapid degradation of the enzymes. The thin mash should give more complete breakdown of the grain starch so that you should not have any unconverted starch in the wort. Finally, because the enzymes are degraded rapidly their action will be complete in 10 to 15 minutes, so mashing for longer than that will not affect the fermentability of the wort.

An important consideration in this method is the bag itself. The mesh should be fairly coarse, but not so coarse that it cannot hold in the wet grain. And it must be sturdy enough to hold the wet grain without any risk of splitting, because that will create a stupendous hot and sticky (and dangerous) mess, so be sure to buy a suitable bag from a reputable supplier.

The bag must obviously be big enough to fill the pot, and to hang over the edge so that it can be securely fastened to the rim of the pot with spring clips. It should also be supported at the bottom with something like a metal trivet so that it is insulated from direct heat applied to the bottom of the kettle. If you don't lift it off the bottom you will scorch part of the mash. I also recommend heat-resistant, non-moisture absorbent gloves since you are going to

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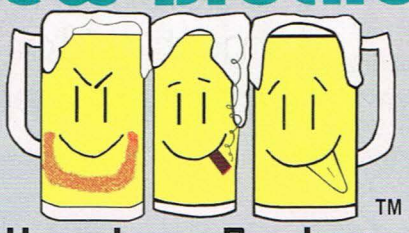
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have to lift it partly out of the kettle and squeeze it to get out as much liquor as possible.

Step by step

1. Set up kettle on the heater, placing the trivet or other support on the bottom.
2. Put the bag in place, allowing it to just hang over the rim and use spring clips to fix it firmly in place.
3. Start adding the water and begin heating once you have a gallon or so into the kettle. Turn up the heat as you add the rest of the water. The amount of water will depend on your recipe, but you will need 8–9 gallons (30–34 L) of water for a 10-lb. (4.5-kg) grain bill.
4. When the water reaches strike temperature (about 10 °F, or 5.5 °C above required mash temperature), turn off the burner and add the grain. Stir the mash well to avoid clumping. This is generally much less of a problem with US 2-row pale malts than with their British counterparts.
5. When the mash is thoroughly mixed, check temperature, and apply heat (if required) to reach target mash temperature.
6. Mash for 60 minutes, adjusting the temperature at intervals as required.
7. When done, place a clean bucket close to the kettle, unclip the bag and lift it out of the water. Hold the bag above the level of the liquid while it drains into the kettle.

For larger batches with bigger grain bills, rig a ladder or a pulley to hang the bag to drain and squeeze into the kettle. Apply some squeezing by rolling the neck of the bag tightly, using gloves as I have recommended earlier. This is the hard part of the procedure and how long you allow the bag to drain will depend upon both your strength and your patience!
8. Put the bag in the bucket, and start heating the wort, adding any extra drainings from the bucket after the bag has stood there a further 15 minutes or so.
9. When you have all the wort together check its volume (you did calibrate your vessel, didn't you?), and check its specific gravity. Adjust hop rate, if necessary, as described earlier, and boil for 90 minutes.
10. At end of boil, siphon wort off trub, cool, pitch with yeast and ferment, rack and bottle or keg as usual.

Summary

Starting with simple equipment, and becoming acquainted with the requirements of all-grain brewing before spending money on more sophisticated gear is the best way to go. And in that respect, brewing in a bag is a simple and effective way in to all-grain brewing. You can build from there to a more complicated (and expensive) system if you wish. BYO

Terry Foster writes "Techniques" in every issue of BYO.

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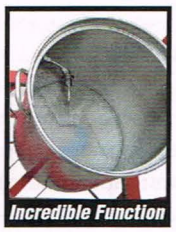
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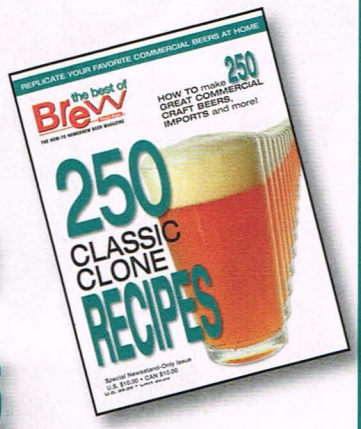

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The Dreaded Diacetyl

Minimizing vicinal diketones

by Chris Bible

Vicinal diketones (VDKs) are the products of normal beer fermentation within a brewery. The two VDKs that are of primary concern to brewers are 2,3-butanedione (diacetyl) and 2,3-pentanedione.

Diacetyl in a finished beer creates a slickness on the palate at low concentrations, and has a characteristic flavor that is described as buttery or butterscotch at higher concentrations. 2,3-pentanedione has a characteristic flavor that is often described as honey-like. Reported diacetyl and 2,3-pentanedione taste thresholds vary between different published references, but a taste threshold range of 0.07–0.15 mg/L (0.07–0.15 ppm) for diacetyl, and a taste threshold range of 0.9-1.0 mg/L (0.9-1.0 ppm) for 2,3-pentanedione is generally agreed upon. Although the production of VDKs during fermentation is normal, these compounds are generally considered to be undesirable in a finished beer.

Ketones are chemical groups containing a central carbon atom double bonded to oxygen, with the other two bonds connecting to two other carbon-containing molecules. A diketone is simply a molecule with two ketone groups. Diacetyl is actually the simplest possible diketone. "Vicinal" refers to two functional groups bonded to adjacent carbon atoms. In the case of diacetyl and 2,3 pentanedione, the two ketone oxygens are double bonded to adjacent carbon atoms.

Although VDKs can sometimes be produced by the metabolic activity of contaminant bacteria within a brewery (notably *Pediococcus*, and to a much lesser extent *Lactobacilli*), the most common source of (the precursors to) VDKs is from the brewing yeast.

Diacetyl is produced during fermentation as a byproduct of valine synthesis pathway. During fermentation, yeast produce the diacetyl precursor α-acetolactate, which is an intermediate in the pathway from pyruvate to the amino acid valine. α-acetolactate leaves the yeast cell and then undergoes oxidative decarboxylation to form diacetyl.

2,3-pentanedione is produced by yeast during fermentation as a byproduct of isoleucine synthesis pathways. Within the isoleucine synthesis pathway during fermentation, yeast produce an intermediate called α-acetohydroxybutyrate which can then form 2,3-pentanedione.

Figure 1 on page 70 shows a graphic representation of the pathway for production of diacetyl by yeast.

Fortunately, yeast are capable of removing VDKs from the beer by additional metabolic actions that occur later in the fermentation process. Yeast take in diacetyl from the fermenting wort and, through enzymatic reduction of the ketone groups, convert diacetyl to acetoin. The acetoin may then be further reduced to 2,3-butanediol. Yeast can convert 2,3-pentanedione directly to 2,3-pentanediol. There are numerous enzymes within the yeast that are believed to catalyze these reduction reactions including diacetyl reductase, ADH1, BDH, GRE3, YPR1, OYE1, OYE2 and ARA1.

Both acetoin and 2,3-butanediol are relatively flavorless compounds, so the action of the yeast on the VDKs can effectively "clean up" the fermenting wort and remove the buttery/butterscotch/honey flavors that are characteristic of VDKs.

Figure 2 on page 71 illustrates the pathway for the enzymatic reduction of diacetyl to butanediol by yeast.

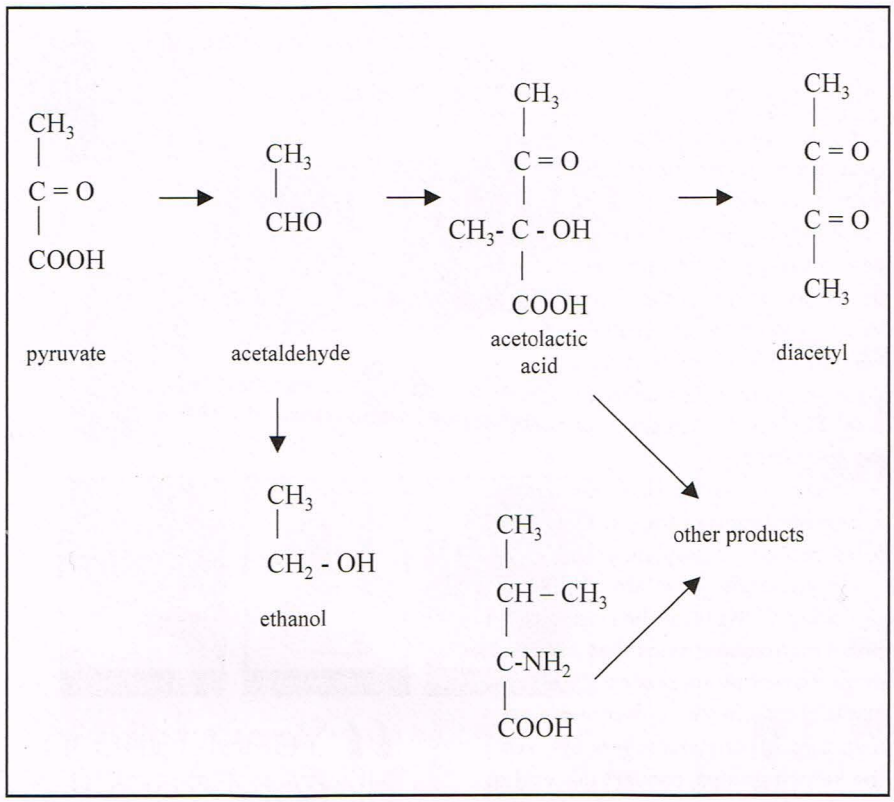
So, yeast produce the precursor to diacetyl (and 2,3 pentanedione) enzymatically within the cell. Outside of the cell, the precursors are oxidized (non-enzymatically) to their respective VDK. The yeast then take the diacetyl (or 2,3 pentanedione) back into the cell and enzymatically convert it to a neutral molecule.

Practical implications

There are numerous factors that influ-

> "Yeast take in diacetyl from the fermenting wort and, through enzymatic reduction of the ketone groups, convert diacetyl to acetoin."

Figure 1: Diacetyl Production by Yeast



ence the production of VDKs by yeast. Some specific brewing yeast strains are known to produce VDKs in higher concentrations than other strains (e.g. English ale strains). Additionally, highly flocculent yeast strains will tend to settle out of the beer during fermentation and may not be available later in the fermentation process to effectively reduce the VDK compounds and precursors.

Inadequate oxygen levels during the initial stages of fermentation or too high dissolved oxygen levels during the middle-end phases of fermentation can contribute to higher VDK production by the yeast. A yeast pitching rate that is too low will also contribute to increased VDK production.

Additionally, a fermentation temperature that is higher than optimal for a particular yeast strain will lead to production of higher amounts of VDKs. Also, since the yeast metabolic pathways for production of VDKs involve amino acids, a wort that is

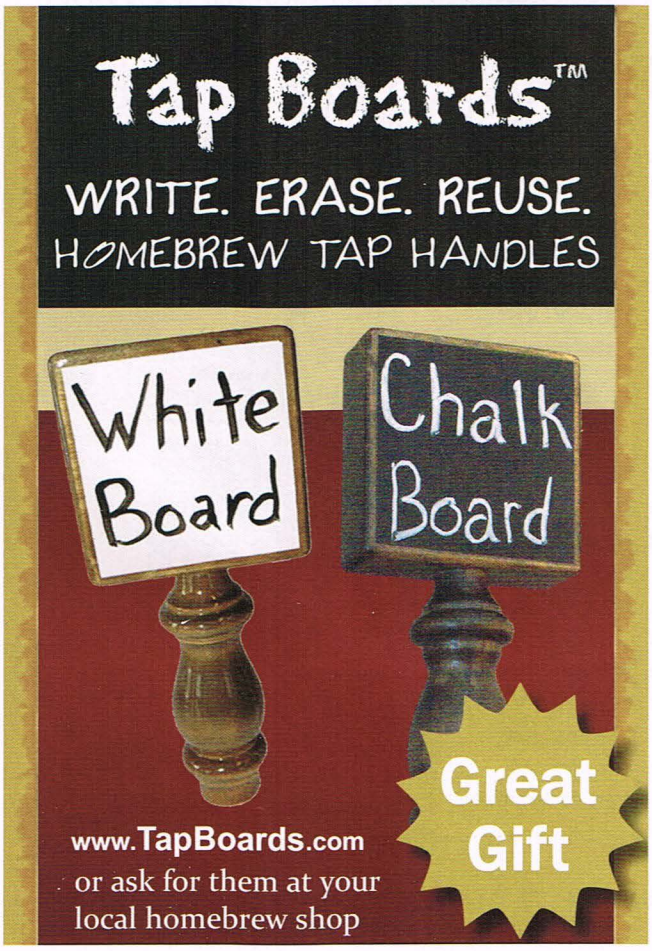
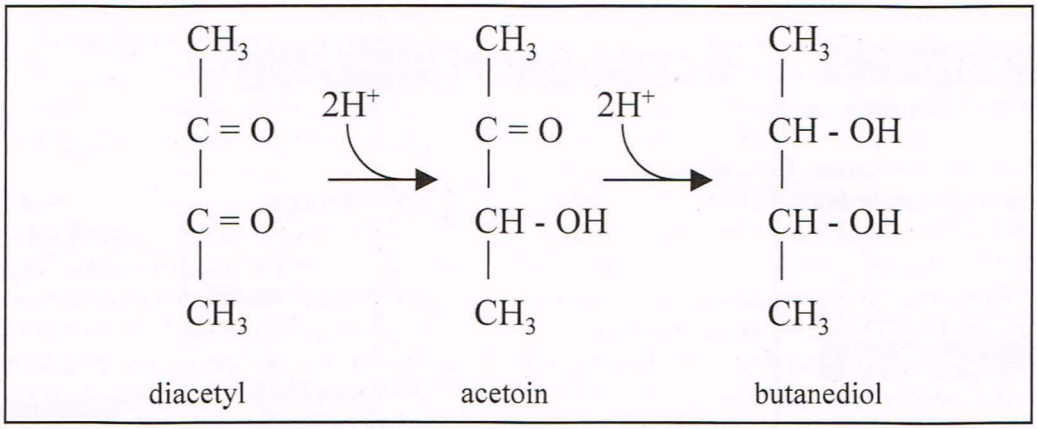


Figure 2: Enzymatic Reduction of Diacetyl by Yeast



low in free amino acids or an unhealthy yeast that does not readily uptake amino acids from the wort will often lead to the production of higher than desired amounts of VDKs. Using a high-quality malt with sufficient (but not excessive) free amino nitrogen (FAN) will help ensure the availability of leucine and valine within the wort.

Diacetyl rest — getting VDKs out

Unless the beer style being produced has VDKs as a part of the desired flavor profile, brewers will want to either prevent the formation of VDKs in the beer, or allow the yeast to remove the VDKs and precursors from the beer during fermentation. To allow the yeast the opportunity to do this, it is important to allow adequate time and temperature for diacetyl reduction during fermentation. This is commonly known as a "diacetyl rest." A diacetyl rest is accomplished by allowing the fermentation temperature to remain high (for an ale) or to increase (for a lager) for 1-2 days near the end of the fermentation process. Because diacetyl reduction is slower at cooler temperatures, this is especially important when making a lager beer. Brewers who are unable to

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raise the temperature of a lager fermentation can simply give the beer more time at fermentation temperature before slowly lowering the beer to lager temperatures.

For a lager beer, raise the fermentation temperature from normal lager fermentation temperatures (45–55 °F/7.2–13 °C) to 65–68 °F (18–20 °C) for about two days near the end of the fermentation process. Try to begin the diacetyl rest when the beer is approximately 1.002–1.005 specific gravity points away from the targeted final gravity. After a two-day hold at the higher temperature, lower the temperature to the desired conditioning temperature for the lager.

For an ale, the fermentation temperature is usually 65-70 °F (18–21 °C), so increasing the temperature during fermentation is not really necessary. It is, however, still important to allow the beer to "rest" at this temperature for 1–2 days after active fermentation appears complete in order to give the yeast time to accomplish reduction of the VDKs. Brewers often make the mistake of quickly "crashing" the temperature of the beer after fermentation appears complete. Crashing too quickly will prevent the yeast from reducing the VDKs. Alternately, the precursors may still remain in the beer and diacetyl will "bloom" later.

For a beer made using an especially flocculent yeast strain, it might also be a good idea to rouse the settled yeast at the end of the fermentation process by briefly agitating the beer in the fermenter. This will help to re-suspend the yeast within the beer, allow the yeast to have more contact with the beer, and give more time for the precursors to react and give the yeast a better chance to reduce the VDKs that might be present within the beer.

In many commercial lager breweries, a negative test for diacetyl is required before the beer is cooled for lagering.

Conclusions

To minimize production of diacetyl and 2,3-pentanedione in your beer, do everything that you possibly can to create conditions that are favorable for a strong, rapid fermentation. Healthy yeast produce the VDK precursors, but also take up and reduce the VDKs from beer. Ensure that quality malt with an adequate, but not excessive, amount of FAN is used in the mash. Aerate/oxygenate the wort thoroughly before pitching, but do not do anything (such as racking) that would introduce oxygen from high kräusen through conditioning. Select a yeast strain that is not highly flocculent and that is known to not be a producer of high levels of VDKs. Pitch an adequate amount of fresh, healthy yeast. Control fermentation temperature to the optimal point for the particular yeast strain. Allow a period of time near the end of active fermentation for a "diacetyl rest" to allow the yeast to reduce the VDKs and precursors within the beer. BYO

Chris Bible is BYO*'s "Advanced Brewing" columnist.*

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RAMPANT LION (FLANDERS ALE)

OG: 1.070 FG: 1.017 ABV: 6.9% ABW: 5.5% IBU: 24 COLOR(L): 60

DESCRIPTION: Dark ale fermented with a Flemish sour blend of Saccharomyces yeasts, Brettanomyces, Lactobacillus, and Pediococcus; resulting in a complex, dark stone fruit character. **Recipe for 5 US gallons (19L)**

QUANTITY	INGREDIENTS	COMMENT
10 lbs	Briess Pilsen Malt	
2 lbs	Briess Caramel Malt 60L	
1 lb	Briess Caramel Malt 120L	
.5 lb	Briess Carabrown® Malt	
.25 lb	Briess Midnight Wheat Malt	
.5 lb	Sugar	
1 oz	Willamette (5%AA hop)	60 min boil
1 oz	Willamette (5%AA hop)	20 min boil
2 vials	WLP665 Flemish Ale Blend	
1 capsule	Servomyces Yeast Nutrient	10 min boil

BREWING PROCEDURES:

1. Mash grains at 152°F for 45 minutes
2. Heat to 170°F
3. Lauter
4. Boil with bittering hops for 40 minutes
5. Add second hop addition, boil 20 minutes
6. Cool to 72°F, oxygenate wort
7. Pitch 2 vials WLP665 Flemish Ale Blend
8. Upon first signs of fermentation cool to 52°F

FERMENTATION:

Primary: 3 weeks at 72°F Secondary: 2-6 months
Bottle: Add ¼ vial of WLP665 Flemish Ale Blend (optional yeast choices WLP001 or WLP550)

EXISTENT-ALE (WITH HONEY)

OG: 1.060 FG: 1.013 ABV: 6.2% ABW: 4.9% IBU: 24 COLOR(L): 10

DESCRIPTION: American-style pale ale. This honey-infused brew may induce long sessions of philosophical reflection on the meaning of life, existence, and what it means to "bee". **Recipe for 5 US gallons (19L)**

QUANTITY	INGREDIENTS	COMMENT
6.6 lbs	Briess CBW® Golden Light LME	
1 lb	Briess CBW® Sparkling Amber DME	
1 lb	Honey	2 days into fermentation
.5 oz	Cascade (6%AA hop)	60 min boil
1 oz	Cascade (6%AA hop)	20 min boil
1 oz	Cascade (6%AA hop)	5 min boil
1 oz	Amarillo	Dry hop
1 vial	WLP008 East Coast Ale Yeast	
1 capsule	Servomyces Yeast Nutrient	10 min boil

BREWING PROCEDURES:

1. Bring water to boil
2. Remove from heat, add extract and first hop addition
3. Boil 40 minutes
4. Add second hop addition
5. Boil 15 minutes
6. Add Final hop addition
7. Boil 5 minute
8. Cool to 66°F, oxygenate wort
9. Pitch 1 vial WLP008 East Coast Ale Yeast

FERMENTATION:

Primary: 2 weeks at 66°F | Primary: 2 days after start of fermentation heat honey with 1 quart of water to 160°F, hold above 145°F for 30 minutes, cool then pour into fermenter
Secondary: 2 weeks, dry hop 1 oz Amarillo

Control Your Mash

Add temperature detectors

by Christian Lavender

I spent a lot of time controlling temperatures on the cold side of the brewing process in my early homebrew days, including temperature control during grain, hop and yeast storage, yeast propagation and maturation, fermentation, homebrew aging and serving. Adding controls to these areas definitely made a huge impact on the quality of my brew, so recently I shifted my attention to the hot side to see what further benefits temperature control could add.

I needed a way to measure the water temperature of my hot liquor tank (HLT) and mash lauter tun (MLT) vessels and then fire the burners on and off as needed, so I bought a few temperature control switches and wired them into a relay and programmable logic controller (PLC).

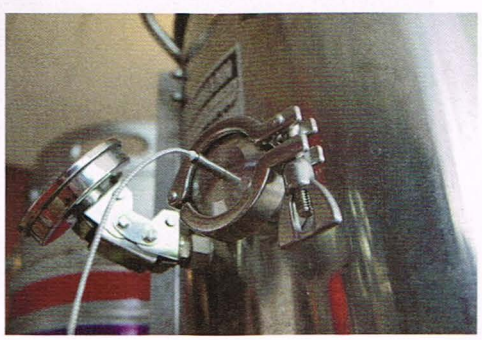
I used solenoid gas valves and welded the gas lines inside the stainless steel frame back to a single propane input. I used low-pressure hurricane burners paired with hot surface ignitors (Emerson #767A-380). Now I could program my PLC to preheat the hot surface ignitors and open the propane valves when a set temperature range was reached on the temperature control switch. The burners fire on and fire off. Success! Now that I had a stage set I needed a cast of characters to actually take the temperature measurements that this system is completely dependent on.

For sanitation and cleaning ease I chose tri-clamp connections throughout the system, so I wanted a tri-clamp thermowell I could easily remove for cleaning too. Next I needed a sensor, but what kind? Thermocouple, thermistor and RTD are the standard varieties in the marketplace and I prefer RTD for brewing applications.

The result after installation of the RTD temperature controls was precision mashing with target temperatures hit every time. The RTDs, stainless steel braided wire and connectors all came from Omega Engineering. XLR connectors that plug into receptacles were ordered from Amazon. Weldless bulkheads were from Brewers Hardware. PLC (programmable logic controllers) and relays were from Automation Direct. Gas solenoid valves sourced from Asco Valves.

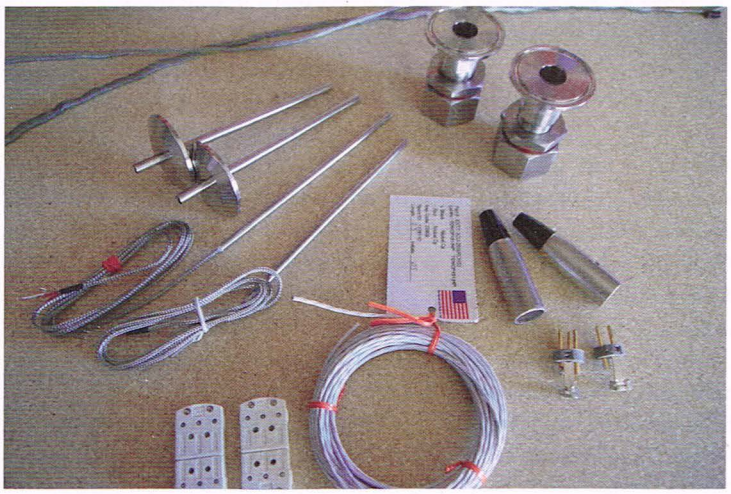
Warning: This project involves elements that are dangerous, including electrical wiring and controlling combustible gas. If you are not experienced with (and don't feel comfortable) working with any of these elements mentioned here, do not attempt to do this project yourself. Ask a licensed professional or similarly experienced person to help you.

> "I needed a way to measure the water temperature of my hot liquor tank (HLT) and mash lauter tun vessels and then fire the burners on and off as needed . . ."



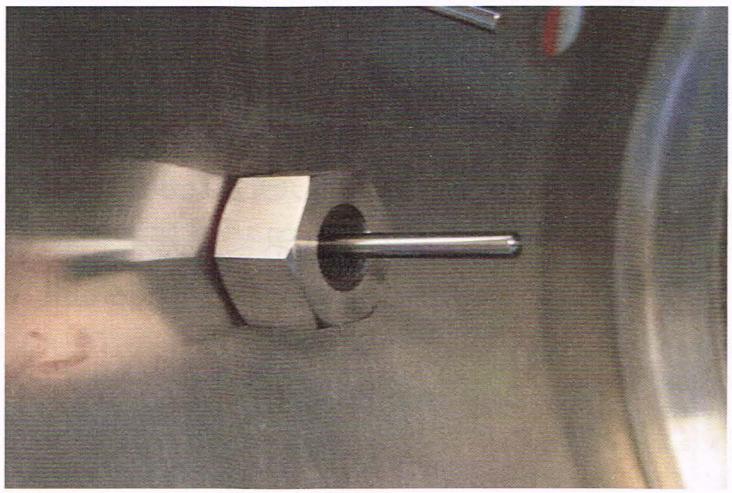
Parts and Tools

- Solid weldless bulkhead ½-inch MPT X ½-inch FPT
- 1.5-inch tri clamp temperature probe thermowell (5-inch)
- 1.5-inch tri clamp
- 1.5-inch tri clamp gasket
- 1.5-inch tri clamp X ½-inch FPT
- XLR female and male connector
- general purpose RTD probe (#PRTF-10-2-100-¼-12-E-SB) 3-wire fiberglass insulated, fiberglass jacketed, stainless steel overbraided cable
- Insulated extension probe wire (#EXTT-3CU-26S-25)
- MFL gas and liquid quick disconnects (threaded)
- 3-Prong Mini flat pin Connector for RTD wire
- Wire cutters/strippers
- Wire shrink tubes and flame
- Drill and step bit
- Wrench and needle tip pliers and screw drivers
- Soldering iron and solder



1. GATHER THE HARDWARE

When you order multiple parts from multiple places online you can expect that not all the parts will arrive at the same time, fit together perfectly — and in my case, not all the parts even arrived. After a few adjustments in part size and some emails back and forth I finally received all the parts needed to build these RTD thermowells for my mash tun and hot liquor tank. I chose not to add a sensor to the boil kettle because I never really have an issue with my rolling boil temperature. If you wanted to add a sensor to the boil kettle then go for it. Give yourself plenty of time when working on electrical projects like this and always use caution.



2. MOUNT THE BULKHEAD

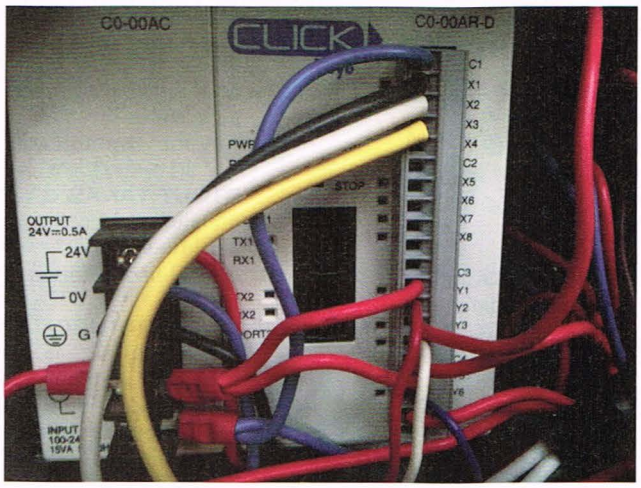
I brew 5- and 10-gallon (19- and 38-L) batches in my 15.5-gallon (59-L) mash/lauter tun vessel, so I needed to mount the sensor low enough to be submerged during the smaller mashes. I filled the kettle with 3 gallons of water and marked where the top of the water hit. I used a step bit and drilled off to the side of the kettle away from the other connection valves. After sanding and smoothing down the new ⅞-inch hole, I mounted the bulkhead with dual gaskets. This bulkhead is computer numerical control (CNC) machined from a solid hex of 304 stainless steel. As you can see, the 5-inch thermowell reaches a few inches into the kettle for nice exposure to the mash and water temperatures.

3. WIRING

Here is where your soldering skills come in handy. I needed to connect the following: RTD probe →wire→shrink tube→3-pin connector male to 3-pin connector female←shrink tube←wire←XLR male case and connector. Easy right? The main thing to remember is to slide the XLR case and shrink tube onto the wire before making your wire to XLR connection solder. I forgot to do this and it's not fun to redo. The quick 3-pin connectors use screws for wire connection, so they are very easy. The purpose behind the 3-pin connectors and extension wire is just for extra wire length to reach the control panel. You can get your probes with any length wire you want, but I just thought it would be nice to be able to break the connection in the middle if needed.

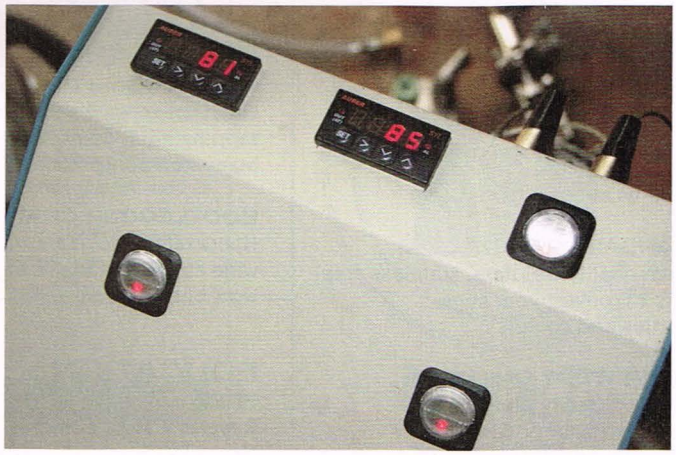
4. CHOOSING THE BRAIN (PLC)

The PLC board I chose for this project was a Click Koyo (#C0-00AR-D) paired with the stackable power supply (#C0-00AC) The PLC had 8 AC IN / 6 RELAY OUT and required 24 VDC power. I used Zettler relays (#AZ2280) to control various parts of the machine. This is an easy board to work with for newbies and it has free downloadable programming software, online help and video training if needed. Some other popular options are the Brewtroller, BCS-460 (iPhone app available) or open source Arduino.



5. BOX IT UP

A metal box from Fry's Electronics was used as my main control panel. I machined out some holes and mounted it on an extension arm from the main chassis. Next I popped in my Auber temperature control switches and LED pump switches. On the backside of the control panel box I mounted the XLR female connectors and a master power switch. Under the control panel, on the side of the chassis, I mounted a PVC weather resistant box to hold the PLC, power supply and relays and connected the two boxes with a plastic conduit tubing. Through this tube I was able to run the necessary control wire and power wires.



6. CONNECT AND TEST

Be sure to set the Auber temperature controller to read from RTD sensors and not the default thermistors before clicking in the temperature sensors and brewing. If you don't your readings will be off or may not even read anything at all. Next, put the probes into a glass with a slurry of crushed ice and water. Let it rest for a minute or two until the temperature stabilizes. I wrote down the temperature it was reading, then subtracted that number from 32. So if you read 42 °F then 32-42=-10. I found the Pb value in the configs menu and made it match the number I calculated. I was calibrated. Finally I tested a few batches of water through the system and was ready to brew! BYO

Christian Lavender is a homebrewer in Austin, Texas and founder of Kegerators.com and HomeBrewing.com.

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Brew Cover

Homebrew club is a hit at NHC

by Betsy Parks

After attending the National Homebrew Conference (NHC) in San Diego for the first time in 2011, the members of the Greater Everett Brewers League (GEBL) in Everett, Washington knew that they wanted to go big for club night in 2012. After all, the NHC would be held on their home turf — Seattle. The answer? A homage to rock and roll history, replete with an elaborate stage setup and simulated rock concert environment with a Seattle grunge-era soundtrack. Not to mention a music video honoring *Brew Your Own*!

Club member Brian Searfass said that he pushed hard for the rock theme so that they could sing a parody of the Dr. Hook classic "Cover of the *Rolling Stone*" with lyrics rewritten to honor *BYO*: "Cover of the *Brew Your Own*."

"I wrote the lyrics after the NHC in San Diego in July last year," said Searfass. "The original idea was to try and do a stage and do it live, but we decided that the logistics of that would be a little over the top."

Instead, the club enlisted the help of a local audio/video editor to make their own music video. Club members featured in the video (Larry Westvang, Lisa Searfass, Brian Searfass, Mike Floyd, David Allen, Jim Brischke, and Karen Winchell) perfected their performance with lots of practice — and homebrew.

"We met for three practices at club members' houses," said Searfass. "Each practice we sang the song maybe four times and then discussed how we thought it went and the lyrics. It was shot in three different locations and we did three shoots for each location. We went through a lot of beer to make that video."

The result? Some good times at NHC's club night.

"The first time we played it at NHC I think it took a lot of people by surprise," said Searfass. "The second time we had a larger crowd that formed around the screen. By the third time we did it we had people singing along to the chorus."

Their efforts paid off — the GEBL stand won the award for "Best Stand" at NHC (as well as the coveted "Golden Urinal Award," which is given to the club that brings the most kegs). Was it the video that pushed them to the top spot? Well, we at *BYO* would like to believe that — but of course it was the efforts of the GEBL, which built a the booth, featuring a wall of amps and "backstage" access to their specialty brews.

"They had security guards who escorted you backstage behind some curtains where you could try their high gravity and more funky beers. It was cool!" said *BYO*'s Kiev Rattee, who attended the NHC. "And every time they would play the video on the screen above their booth everybody would stop to watch it."

Thanks to their stellar performance (cough cough) at the NHC, the GEBL has enjoyed more visibility, which has fostered an increase in interest for the club. Searfass said they've been signing up one or two members every meeting.

A repeat performance in 2013, however, is probably not in the cards.

"The first time the club went to NHC was San Diego, so we considered that our dry run," said Searfass. "In Seattle we knew the transport would be much simpler. So, I don't think there will be a repeat performance in Philadelphia. It was our home court so if we were going to do it we had to go for it."

To watch GEBL's video parody "Cover of the *Brew Your Own*," visit www.byo.com/videos/24-videos/1932-cover-of-the-brew-your-own-music-video BYO

> "By the third time we did it, we had people singing along to the chorus."

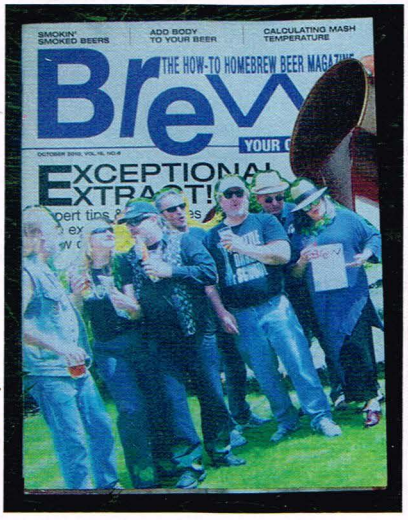

Photo Courtesy of Brian Searfass

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