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BrewY

THE HOW-TO HOMEBREW BEER MAGAZINE

OCTOBER 2011, VOL.17, NO.6



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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.

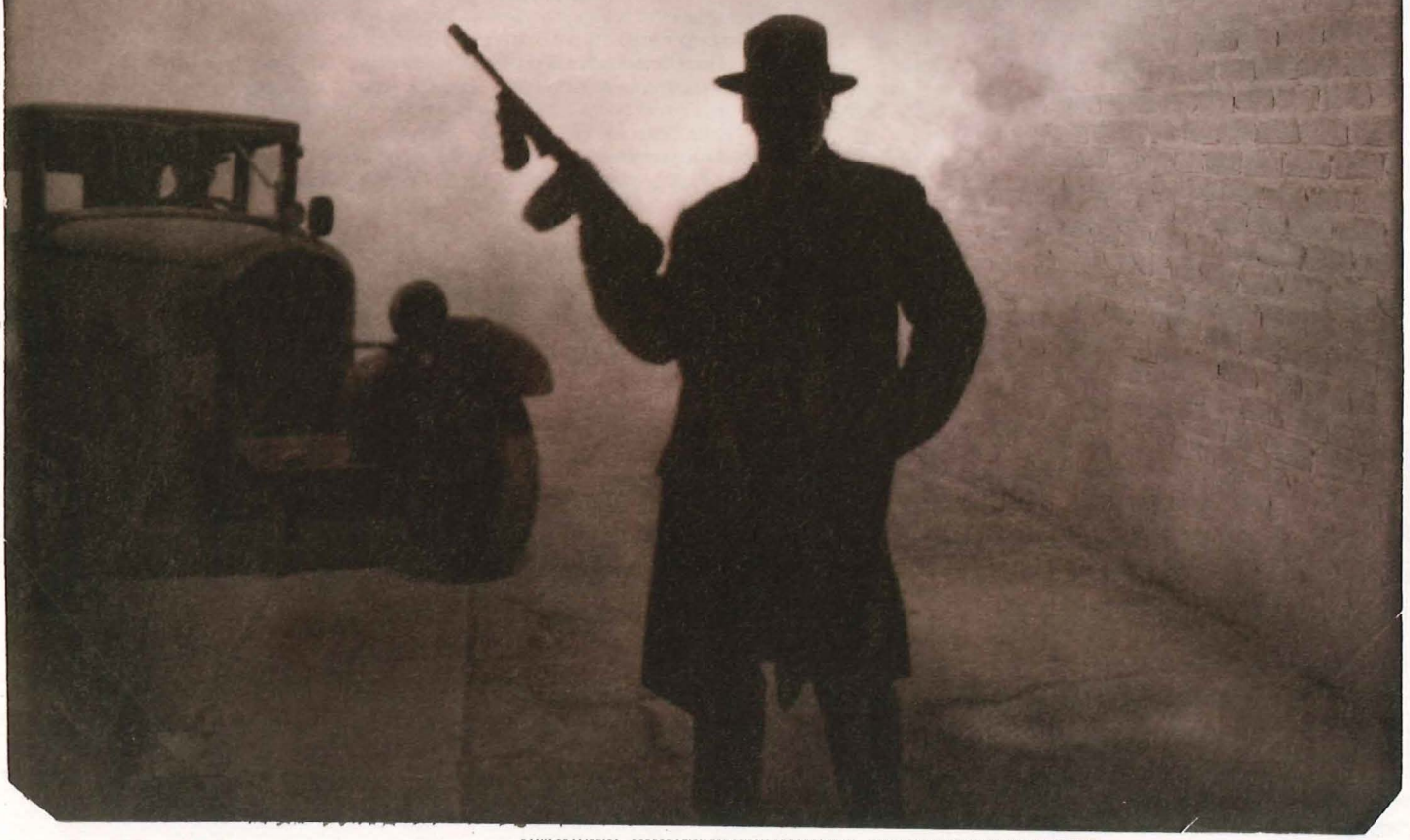
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what's happening at BYO.COM

Brewing and Cooking



Homebrew Chef, Sean Paxton, who writes about cooking with Maibock on page 42, isn't the only one who likes to cook with homebrew. Lots of chefs — professional or otherwise — enjoy cooking with beer. Read more on the Web about using your homebrew as an ingredient in your kitchen.
www.byo.com/component/resource/article/499

Keeping Up With Chris Colby



Where in the world is *BYO*'s Chris Colby? Typically, Chris is somewhere near Austin, Texas, homebrewing, growing hops and barley and caring for a menagerie of house cats. But sometimes he's somewhere else, like Boston . . . or Belgium. Keep up with Chris in his blog.
www.byo.com/blogs/blogger/Chris Colby/

Brew More Beer



Want more homebrew recipes? *BYO* has them! Check out this online directory of recipes, searchable by style, to find some inspiration for your next great batch of homebrew.
www.byo.com/stories/recipeindex

Cover Photo: **Charles A. Parker**

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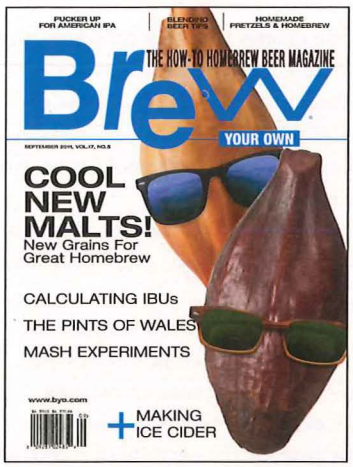
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Volume 17, Number 6: October 2011



Cream ale conversion

I would like to use the cream ale recipe on page 20 of your July/August 2011 issue and I have a question. It says you should hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. Do you know about how long this would take or how I might know when this has occurred? I have brewed a number of all-grain recipes in your 250 clone recipe magazine and I'm not used to this terminology. Thanks and I really enjoy your magazine!

Brad Buck
via email

You can test for enzymatic conversion with an iodine test. Take a small sample of wort, free from grain solids, and place it on glass or porcelain with a white background (such as a plate). Don't put the sample on paper, as starches in the wood will interfere with the test. Add a drop of iodine solution — some homebrew shops sell tincture of iodine for this purpose or you can use iodophor — and observe the color. A color change to black or purple indicates the presence of starch. No change in color means the level of starch is below the level of detection of the test.

Alternately, you can just mash for 60 minutes. The odds of the mash not converting by that time are very low.

Praise for *BYO* comes . . .

Justin Burnsed's article about gose in the May-June 2011 issue spurred us to try the recipe. My son and I have been homebrewing together for about 10 years and have been drawn to unusual beer types and recipes, so we decided to try the gose. In my opinion, the results rank in our top three — it's quite refreshing on hot summer days and it's complex enough that I want to enjoy it slowly in a nice glass. Don't know if we'll do it again as we're always interested in trying something new, but I'm glad we got sucked in by the history lesson.

Jim Biehle
Ballwin, Missouri

We're glad you enjoyed the history lesson and enjoyed your

contributors



Lisa Morrison, also known as the Beer Goddess, hosts "Beer O'Clock!," a weekly, hour-long commercial radio show devoted to great beer, available in podcasts on KXL.com and iTunes. She is a regular columnist for numerous beer publications and blogs, including *All About Beer*, *Beer Advocate*, *Celebrator Beer News*, CraftBeer.com and her own website, beergoddess.com. Lisa started homebrewing with her husband, Mark Campbell, in 1991 and started writing about beer in 1997. In 2004, she became the first female recipient of the national Beer Journalism Awards. Her first book, "Craft Beers of the Pacific Northwest" was released in April. On page 34 of this issue, she writes about regional breweries of the past.



Steve Bader is the owner of Bader Beer and Wine Supply in Vancouver, Washington. Bader was *Brew Your Own* magazine's Replicator for many years, interviewing brewers and compiling numerous clone recipes for readers who wrote in. (He even suggested that Marc Martin, our current Replicator, be his replacement.) In 2002, in *BYO*, Bader wrote the first article on what has become known as the "extract late" technique — withholding a portion of the malt extract in a recipe until the final minutes of the boil.

In this issue, on page 34, he supplies the clone recipes — Olympia, Dixie, Choc, Hamm's and Rolling Rock — for Morrison's retro regional beer article.



Sean Paxton, also known as "The Homebrew Chef," was a professional chef and has been a homebrewer since 1993. Combining the two talents, he has prepared several high-profile dinners, including those made for the Northern California Homebrew Festival.

Many of his beer-inspired recipes and menus can be found on his website, www.homebrewchef.com.

On page 42 of this issue, he discusses cooking with Maibock — a malty beer in the bock family. The clean, malty flavors and mild spiciness of the hops make this a wonderful beer style to cook with.

And if you're wondering how to brew a Maibock, see page 19 as that is this issue's beer style in our "Style Profile" column, written by Jamil Zainasheff.

beer. If you have any other questions, don't hesitate to ask. We could answer them, maybe even later in this column.

. . . and praise for *BYO* gose

I have purchased your magazine from my LHBS for the few years I have been homebrewing. I only do extract brewing and am glad that your magazine offers alternatives to the all-grain recipes you post. I am writing about the gose extract recipe from the May-June 2011 issue. I was very excited to brew this as my wife and I love anything sour and wheat based. On brew day, I followed your extract recipe directions. From the time I steeped and rinsed my grains (all acidulated malt), it almost looked as if my wort was milk or cream. It stayed this way through the secondary fermenter and into the bottle. When I pour it, it looks almost like a glass of chocolate milk. It tastes pretty much how I expected a gose to — salty, sour, but the appearance was obviously wrong. So I took a bottle to my LHBS. The three guys behind the counter tasted it and agreed that it tasted pretty OK, but the appearance was a deal breaker. When they read the recipe I brewed from, one of the employees noticed that I did not have any base malt with acidulated malt. He double checked online and saw that the acid malt has no diastatic power so I should have had some measure of Pilsner, 2-row or 6-row. He claims that this omission was the cause of my cloudy, chunky end result. So, I was wondering what your thoughts are on this beer. Would I just need to add some base malt to the steep to correct these problems? Any other reason that it would turn out this way? Thanks for the input!

Spence Anderson
Raleigh, North Carolina

We try to provide extract versions of all BYO *recipes, but sometimes this forces us to make some compromises when certain ingredients are called for. In the case of the gose recipe, we tried to make an extract version that would be easy to make and taste like gose, at the expense of a certain level of haze, but obviously it ended up too cloudy. Sorry. If you try the recipe again, you should steep at least 2 pounds (0.91 kg) of 6-row or 3 lbs. (1.4 kg) of 2-row pale malt along with the acidulated malt. In the future, we'll be clear when an extract version has potential downsides. (Most don't.)*

Acidulated malt

I need a clarification. The all-grain recipe for There She Gose Again on page 31 of the May-June 2011 issue of *BYO*, calls for 2 pounds of acidulated malt in a total grain weight of 10.75 pounds. If my math is right, this is 18.6%





of the grist. In Terry Foster's good article "A Global Perspective" on page 57, he suggests that the acidulated malt should not exceed 10% of the grist, a figure I found elsewhere in several on-line articles. Is the recipe correct? If so, what does this high amount of acidulated malt do to the taste and sugar levels of the resulting beer and are there any specific suggestions for handling this malt in the mash beyond those given in the article?

Jim Biehle
Ballwin, Missouri

Oh hey, Jim. Thanks for writing in again. Both of the authors are correct, even though they are seemingly contradicting each other. The key to understanding this is that gose is supposed to be a (mildly) sour beer. When Foster (and others) give the 10% cap on acidulated malt, that is for "regular" (non-sour) styles of beer. Generally, acidulated malt is used to lower the mash pH without affecting the flavor of the beer (i.e. it's not used to add a tart edge, just to counteract water chemistry in some pale styles of beer.)

In the gose recipe, Justin uses almost twice as much as the "regular" recommendation because the malt is intended to make the gose slightly sour. For best results with this much acidulated malt, reserve at least half of the acidulated malt (or all of it, if you want) until the final 20–30 minutes of the mash. Acidulated malt contains about as much extract as regular pale malt.

Manguey mix-up

My dad has been homebrewing for 8 years, and reading *Brew Your Own* all that time. As his assistant brewer, I'm responsible for thorough research including careful study of your magazine. Unfortunately, dad doesn't let me participate in quality control. We were particularly excited to see the article on *pulque* in the January-February 2011 issue (my dad is a slacker when it comes to keeping up with issues), since we enjoy making traditional fermented beverages. We also like to grow cacti. On several occasions in the article you refer to the "maguey" Agave (*Agave americana*) as a cacti. Agave are not actually cacti, instead they belong to either the Liliaceae or Asparagaceae families, depending on who you ask. Cacti belong to the Cactaceae family.

Just because something is spiny and grows in the desert, doesn't mean it's a cactus. Like my dad says, "Just because it's called a beer, doesn't mean it is one!"

Alexander Harding, 7 years old
Assistant Brewer,
Menominee River Brewing Co.
Templeton, California BYO

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homebrew nation

READER PROFILE



Brewer: Randy Klein

Hometown: Conshohocken, Pennsylvania

Years brewing: Two

Type of brewer: Tinkerer, Experimenter

Homebrew setup: Usually 5-gallon (19-L) batches, partial mash (haven't stepped up to the all-grain big leagues just yet).

Currently fermenting: Lemongrass Belgian Wit (see recipe to right)

What's on tap/in the fridge: Coffee Bourbon Imperial Porter, 15% Belgian Quad

How I started brewing: I started brewing simply because I wanted to make exactly what I liked to drink. The first time I brewed I picked up a starter equipment kit and a recipe kit from the local homebrew shop. It took me 30 minutes to figure out which piece was the racking cane and which piece was the bottling cane. (Try racking with a bottling cane - it doesn't work too well.)

My blog/website: BrewItAgain.com — a modern social brewing recipe site where users share, comment, rate, and save brewing recipes. The difference between BrewItAgain and other recipe sites is that users can discuss and rate recipes, this way readers have a good idea of the quality of the recipe. It is easy to sort by the best recipes.

reader recipe

Lemongrass Summer Wit
(5 gallons, 19 L, partial mash)
OG = 1.040 FG = 1.012
IBU = 16.7 ABV = 3.7%

Ingredients

6 lbs. (2.7 kg) wheat liquid malt extract
1 lb. (0.45) wheat malt
1 lb. (0.45) Carafoam® malt
1 oz. (28 g) Hallertau hops (60 min.)
0.5 oz. (14 g) Hallertau hops (15 min.)
1 tsp. cracked Coriander seeds (15 min.)
1 tsp. cracked Coriander seeds (1 min.)
0.5 oz. sweet orange peel (15 min.)
0.5 oz. sweet orange peel (1 min.)
4 oz. shredded lemongrass (at flameout)
2 oz. lemon zest (at flameout)
White Labs WLP400 (Belgian Wit Ale) or Wyeast 3944 (Belgian Witbier) yeast

Step by step

Steep the grains in hot water. Add extract and bring to boil. Boil for 60 minutes, adding hops, coriander lemon zest and lemongrass at designated times. Ferment for 14 days at 68 °F (20 °C). Condition, then bottle or force carbonate and keg.

byo.com brew polls



Do you brew using only one method (all-grain, extract, etc.), or do you change it up?

I only brew one way 58%
I brew with a combination of methods 42%

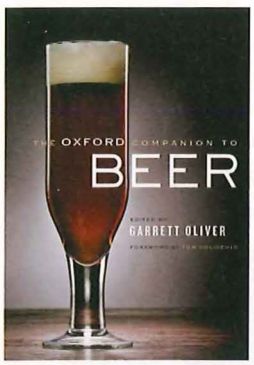
social homebrews

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what's new?

Oxford Companion to Beer



The first major reference work to investigate the history and vast scope of beer, *The Oxford Companion to Beer* features more than 1,100 A–Z entries written by 166 of the world's most prominent beer experts. Edited by Garrett Oliver, this reference is attractively illustrated with over 140 images and covers everything from the agricultural makeup of various beers to the technical elements of the brewing process, local effects of brewing on regions around the world and the social and political implications of sharing a beer. This comprehensive resource also includes thorough appendices (covering beer festivals, beer magazines, and more), conversion tables and an index.
Available at most major booksellers. **www.oup.com**

Beer Smith 2



One of the most popular brewing software packages has been completely rewritten from the ground up to provide an even better experience than version 1.4. Packed with new tools including the ability to formulate grain bills by percentage, calculations for yeast starters, a graphical style guide comparison, new fermentation and carbonation profiles, improved inventory and shopping list management, and a new add-on feature that makes it easier than ever to download and use new ingredients or recipe packs, BeerSmith 2 is also the first release that will be available for both Windows and the Macintosh.
Available for download at **BeerSmith.com**



Queen of Beer



calendar

October 1
Queen of Beer
Placerville, California

Enter the 15th annual women's-only homebrew competition for the chance to be crowned queen! Sponsored by the Hangtown Association of Zymurgy Enthusiasts (H.A.Z.E.) of Placerville, this is a BJCP and AHA sanctioned competition that is open to all non-commercial, homebrewed beers, meads and ciders produced by persons of female gender.
Entry fee: $8
Deadline: September 21
Contact: David Pratt, dpratt2000@gmail.com
Web: http://queenofbeer.hazeclub.org/

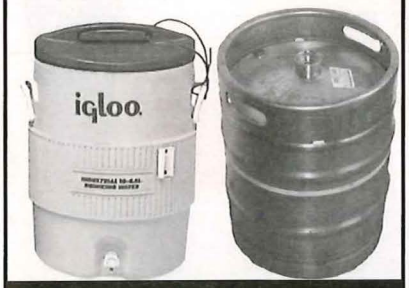
October 21–22
Umpqua Valley Brew Fest
Roseburg, Oregon

It's All About the Water at the 2nd annual Umpqua Brew Fest. Featuring dozens of craft beers from Pacific Northwest and beyond breweries, the two-day festival also features live music, beer-friendly food favorites, and a homebrew competition. Four dollars from every $8 entry in this BJCP-sanctioned event will be donated to the Umpqua Watershed conservation.
Entry Fee: $8
Deadline: October 8
Contact: Diane Griffin, northbank@dcwisp.net
Web: www.umpqua-watersheds.org/umpquabrewfest/
Rules and regulations: http://umpquavalleybrewersguild.com/

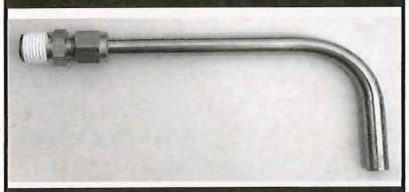
October 26–29
Hoppy Halloween Challenge
Fargo, North Dakota

The Prairie Homebrew Companions will again determine who is the Great Pumpkin of brewers. All BJCP categories including mead and cider can be entered, but the Hoppy Halloween Challenge also includes a "Halloween Theme Beer" category.
Entry Fee: $7
Deadline: October 21
Contact: Tom Roan, tjroan@yahoo.com
Web: http://hoppyhalloween.com/

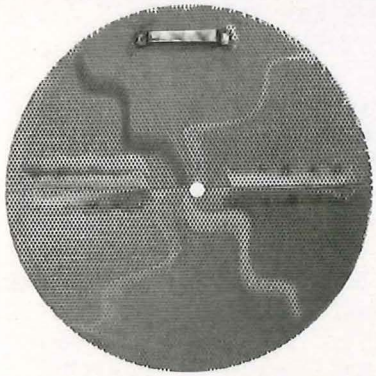
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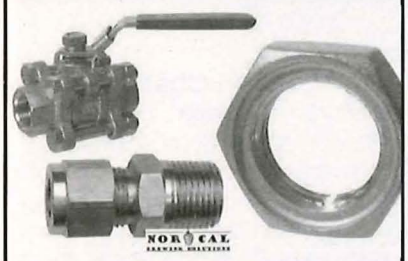


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My New Electric Brewery

Ron Short • Riverside, Rhode Island

When my wife told me to start packing up my brewery in our garage in Florida because she had accepted a position in New England, my heart sank. My brewery setup at the time was a gas-fired, temperature-controlled, 25-gallon HERMS system, which resided in our garage. I knew that the long, cold winters of New England would be a major issue, especially in a rented living arrangement. After unpacking I ended up selling the large kettles and decided to take the indoor electric approach. Visit my blog for more info: http://wottashomebrewblog.blogspot.com/

Photo 1

The brew stand is half of a "Gorilla Rack" shelving unit. I put cork over the shelves in an effort to protect them from high temperatures and spills. The attached wire cage is formed from three wire display racks that are attached to the main rack. A fourth display rack holds the control panel and is very easily moved as needed. Due to the limitations of the rental we moved into, using a 240 volt/30 amp circuit was not possible, so I did a quick survey of the electrical panel in the basement to find that the unit had ample 120 volt/20 amp breakers, which were GFI protected. I would have to design the system to use that for its power source.



Photo 2

The control panel is powered by three separate 120-volt/ 20-amp GFI-protected circuits. One for the main PID and one 1500-watt heating element, one for a second PID and second 1500-watt heating element, and the third circuit to power two Chugger pumps that I purchased on eBay (they work great). The third PID is not used to control anything and that function is disabled but is used for the remote temperature probe for verifying mash temperatures and such. The system is vented to the outdoors using a low cost blower placed on top of the unit and passed through an inexpensive clear plastic storage container, then plumbed to the clothes dryer vent, which leads to the outdoors.



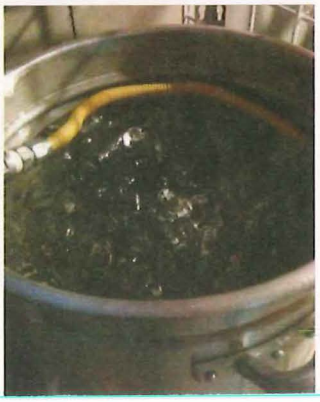
Photo 3

I also opted to construct three separate 1500-watt heatsticks for the heat source, two of which are controlled by their own PID and the third one as a "heat booster" used to ramp temperatures up quickly and to get the wort to a boil in a hurry. That third heatstick is run on its own circuit outside of the control panel and is controlled by a simple switch. Using heatsticks means easy cleanup, easy portability and less holes to worry about in the kettles — I just have to make sure they are fully submerged in liquid before applying power! The upside to this electrical configuration is that it is portable.



Photo 4

The mash temperatures are maintained by use of a 30-plate heat exchanger, and wort is circulated on itself while the hot liquor from the boil kettle is circulated in the other side of the exchanger. It's a parallel loop and works like a HERMS coil would. It is also used to chill the wort and works great! It can chill 200 °F (93 °C) wort down to 50 °F (10 °C) in one pass!



beginner's block

SECONDARY FERMENTATION

by betsy parks

When the active stage of primary fermentation is finished in a batch of homebrew, the show isn't over in the fermenter. The yeast cells in your beer are still active even after the obvious signs of fermentation are finished. Viable yeast cells will continue to slowly ferment some of the more complex sugars in the wort, as well as reduce some of the byproducts created during primary fermentation. Learn a little more about secondary fermentation to brew the best homebrews.

What does secondary fermentation do?

During the vigorous phase of primary fermentation the yeast converts the majority of the easily-fermented simple sugars in the wort to alcohol. After primary fermentation is finished (about three to five days), yeast cell activity slows down as yeast slowly become dormant. Some of the yeast cells, however, stay active after the primary phase and continue to work on some of the remaining sugars, which is a good thing because complex sugars that were not fermented during primary, like maltotriose, still need to be fermented. Secondary fermentation also aids in balancing things like diacetyl and acetaldehyde, which are created during primary fermentation. Allowing your beer to go through this stage of fermentation will give the batch a cleaner flavor profile, and will allow more particles to settle out, leaving clearer beer behind.

Where to condition

Secondary fermentation can take place in one of two places: you can either leave your beer in the primary fermenter and wait, or, when you are sure that primary fermentation is finished, you can rack your wort off the trub and into a secondary fermenter. There is much ongoing debate as to whether racking beer off the trub is necessary as racking can expose newly-fermented (ie: vulnerable) beer to oxidation and contamination. The other side of the debate is that the beer needs to be separated from the dormant yeast at the bottom of the fermenter as it will excrete amino and fatty acids that may create undesirable flavors in your beer if you leave it on the trub for too long. Many ale brewers choose to simply leave the beer in the primary until secondary fermentation is completed, but may choose to transfer it to a secondary fermenter if it needs more time for secondary than two to four weeks.

It is up to you, the brewer, to decide whether to rack or not, depending on the beer style and your homebrewing setup. However, most brewers tend to use secondary fermenters for only higher gravity beers, or lagers, which need more time than ales to complete fermentation and call for cleaner flavor profiles.

Carboys with airlocks tend to make the best secondary fermenters as they are impermeable to air. However, conical fermenters greatly lower the need for racking as the yeast settles into the cone at the bottom of the fermenter, which allows a brewer to easily remove the trub and yeast after primary is over.

How long

Secondary fermentation is a practice in timing and patience. You need to leave your beer alone — without opening the fermenter — for enough time to allow the remaining yeast to bring the beer down to its final gravity and let the remaining yeast settle to the bottom. This typically takes somewhere between two and four weeks, but can be more depending on the beer you are making or the recipe you are following.

If you opt to leave your beer in the primary fermenter, the question is: how long is too long? *BYO*'s Chris Colby and Basic Brewing's James Spencer debated this topic in an experiment in the September 2009 issue of *BYO*, concluding that leaving the beer on the yeast for two to four weeks does not ruin it. If your beer requires more time in secondary, however, you should consider racking to a secondary fermenter.

hop profile

NUGGET



Nugget is an all-purpose North American hop variety that is most often used for bittering, but can also work double duty as an aroma hop. It was selected from a cross between Brewer's Gold and a high alpha male and its alpha acids can range between 11 and 14.5%. It imparts strong, heavy herbal and spicy flavors. Substitutions include Chinook, Columbus, Galena and U.K. Target. Nugget can work in all ales and stouts and is most notably featured in Tröegs Nugget Nectar (see The Replicator on page 12) as well as Nugget Single Hop IPA from Denmark's Mikkeller brewery.

we WANT you

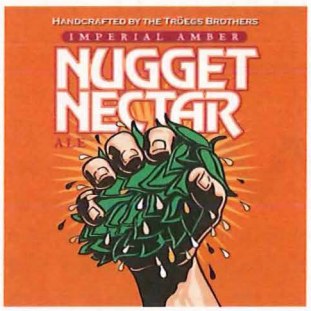


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by marc martin

DEAR REPLICATOR, A FRIEND RECENTLY GAVE ME A BOTTLE OF NUGGET NECTAR FROM TRÖEGS BREWING COMPANY. THE LABEL SAYS THAT IT IS AN IMPERIAL AMBER ALE, COMING IN AT 7.5% ABV WITH 93-ISH IBU'S. I CHECKED THEIR WEBSITE AND FOUND THAT THEY USE PILSNER, VIENNA AND MUNICH MALTS, PLUS SEVERAL DIFFERENT KETTLE HOPS AND A LOT OF DRY HOPS. WHAT IS INTERESTING IS THAT IT IS NOT BITTER — JUST CLEAN HOP FLAVOR. I WOULD LOVE TO BE ABLE TO DUPLICATE THIS BEER.

RICHARD GLEASON, JR.
VISALIA, CALIFORNIA



The story of Tröegs brewery starts when Brothers John and Chris Troegner were inspired to open a business together while living halfway across the country from each other. John, the older of the two, would often hang out at Philadelphia's famous Dock Street Brewpub after a hard day of selling real estate. Meanwhile Chris, an avid skier, was enjoying the good life in Colorado while discovering the area's growing number of great craft beer breweries.

Fortunately for Pennsylvania beer lovers, in 1997 the brothers decided to open their own brewery in Harrisburg, Pennsylvania. These days they produce nine beers that are distributed to eight eastern states and their second location, T2, is scheduled to open in Hershey late this year.

Tröeg's Head Brewer, Andrew Dickson, homebrewed for several years before going pro. He graduated from the American Brewers Guild program in December of 2004 and soon found employment at the rapidly growing Tröegs Brewery where he worked his way up to his position.

Andrew said that the goal of Nugget Nectar was not to produce a "hop bomb," but instead a beer with plenty of hop flavor, solid body and good malt balance. It is based upon their very popular Hopback Amber, only with more malt and a greatly expanded hop bill.

This beer is a beautiful clear amber topped by a medium off-white head. The aroma is dominated by hops featuring notes of citrus, pine and orange. The complex blend of hop varieties makes this a very unique beer. While the flavor is decidedly citrus hop forward, a solid malt backbone provides a nice caramel-laden balance. BYO

TRÖEGS BREWING COMPANY, NUGGET NECTAR ALE (IMPERIAL AMBER)

(5 gallons/19 L, extract with grain)

OG = 1.072 FG = 1.014 IBU = 91 SRM = 12 ABV = 7.5%

Ingredients

6.6 lbs. (3 kg) Muntons light, unhopped, liquid malt extract
18 oz. (0.51 kg) dried malt extract
1.75 lb. (0.79 kg) Pilsner malt
0.5 lb. (0.22 kg) dark Munich malt (20 °L)
0.5 lb. (0.22 kg) Vienna malt
0.5 lb. (0.22 kg) crystal malt (60 °L)
19.5 AAU Nugget hop pellets (90 min.) (1.5 oz./42 g of 13% alpha acid)
3.5 AAU Columbus hop pellets (20 min.) (0.5 oz./14 g of 15% alpha acid)
2.9 AAU Palisade hop pellets (10 min.) (0.75 oz./21 g of 8.25% alpha acid)
13 AAU Nugget hop pellets (1 min.) (1.0 oz./28 g of 13% alpha acid)
21 AAU Simcoe hop pellets (1 min.) (1.5 oz./42 g of 14% alpha acid)
7.5 AAU Columbus hop pellets (1 min.) (0.5 oz./14 g of 15% alpha acid)
Columbus hop pellets (dry hop 7 days) (0.25 oz./7 g of 15% alpha acid)
Nugget hop pellets (dry hop 7 days) (1.0 oz./28 g of 13% alpha acid)
Simcoe hop pellets (dry hop 7 days) (1.0 oz./28 g of 14% alpha acid)
½ tsp. yeast nutrient (last 15 min.)
½ tsp. Irish moss (last 30 min.)
White Labs WLP001 (American Ale) or Wyeast 1056 (American Ale) yeast
0.75 cup (150 g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 152 °F (66.6 °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. Add the hops, Irish moss and yeast nutrient as per the schedule. Add the wort to 2 gallons (7.6 L) of cold water in a sanitized fermenter and top off with cold water up to 5 gallons (19 L). Cool the wort to 75 °F (24 °C). Pitch the yeast and aerate the wort heavily. Allow the beer to cool to 68 °F (20 °C). Hold at that temperature until fermentation is complete. Transfer to a carboy, avoiding any splashing to prevent aerating the beer and add the Columbus, Nugget and Simcoe dry hops. Condition for one week and then bottle or keg. Carbonate and age for two weeks.

All-grain option:

Use a single step infusion mash and an additional 7.75 lbs. (3.51 kg) Pilsner malt to replace the malt extracts. Mix the crushed grains with 3.7 gallons (14 L) of 172 °F (78 °C) water to stabilize at 152 °F (67 °C) for 60 minutes. Sparge with 175 °F (79 °C) water. Collect ~6 gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the 90-minute hop addition to 1.25 oz. (35 g) Nugget hop pellets (13% alpha acid) (16.25 AAU) to allow for the higher utilization factor of a full wort boil. Follow the remainder of the extract with grain recipe.

School Choice

Choosing a brew school

by Betsy Parks



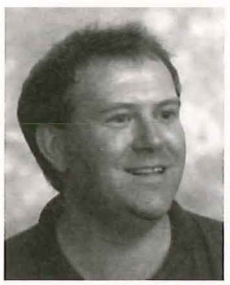
GONE ARE THE DAYS WHEN A HEALTHY INTEREST IN FERMENTATION WOULD BE THE START OF A CAREER. THESE DAYS, A FORMAL BREWING EDUCATION WILL GIVE YOU AN EDGE IN THE COMPETITIVE FIELD OF PROFESSIONAL BREWING. IN THIS ISSUE, THREE BREWING EDUCATORS DISCUSS SOME ADVICE FOR CHOOSING A PROGRAM.

a brewing education is a must these days. We're past the time when an enthusiastic amateur can carry a brand into the marketplace. In the early days of craft brewing all of the pioneers were self-taught and we forget that many more failed than succeeded. There is too much money and too many people's livelihoods at stake to take a chance on untrained employees, particularly now when there are so many potential hires with training out there.

Before choosing a school, decide what your goals are. If the goal is to quickly get hired by a craft brewery then look at the school's placement record, and whether or not it offers an education geared toward making the student an immediate asset to the hiring brewery.

Also, make sure you have any prerequisites in place before attending any school. Math, and a "hard" science such as chemistry, biology, physics or engineering are commonly required. We've found at the American Brewers Guild (ABG) that without some prior education in those topics that the course work is just too difficult. Otherwise we're not giving the student the best chance to master the material.

Be aware of the challenges. In our case it's the workload. The ABG requires 10-12 hrs a week of lecture time, plus time spent reading and taking quizzes, etc. People are drawn to the distance learning course because it can be done part time, but it is still a big time commitment.



Steve Parkes, Owner and Lead Instructor of the American Brewers Guild in Salisbury, Vermont. Steve was also the Brewmaster for Wolavers Organic Ales and Otter Creek Brewing, both in Middlebury, Vermont. In 2009 the Brewers Association presented Steve with the Russell Schehrer Award for Innovation in Brewing.

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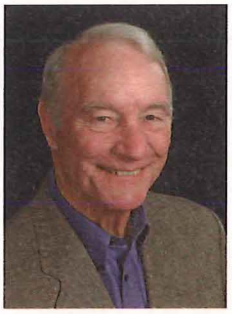
brewing schools by nature teach the same sciences and technologies, but the courses of each of the schools are structured to emphasize different areas or to address the learner's needs and/or existing level of knowledge.

Breweries are hazardous, complex operations, and if a brewer can rely on a well-trained staff member to take on tasks with minimal supervision, they gain substantial freedom to attend to other tasks. As well, brewers who have gone through training are aware of the realities involved in professional craft brewing: heavy lifting, hot and wet working conditions, moderate pay and long hours. Many breweries have been let down by untrained staff who last in the job only a few weeks before quitting because the job did not offer the "creativity and artistry" that they were expecting, but instead found the job consisted of 80% cleaning and lifting while trying to make a small core of recipes exactly the same way each time. Breweries aren't generally looking for new hires that have brewed 150 different recipes, but rather they are looking for staff who know the tough realities behind working as a craft brewer and appreciate all that commercial brewing offers to compensate for those tough realities.

Becoming a professional brewer requires a lifelong commitment to learning, so brewing courses offer the first steps towards building a foundation of understanding of the brewing sciences on which the brewer can base their subsequent studies.



Keith Lemcke, Vice-President of the Siebel Institute of Technology and Marketing Manager for the World Brewing Academy. Keith has a diploma in Malting & Brewing Science from the Siebel Institute as well as a foundation certificate from the Institute of Brewing & Distilling, London, U.K.. Keith was a founding member of the Draught Beer Guild.



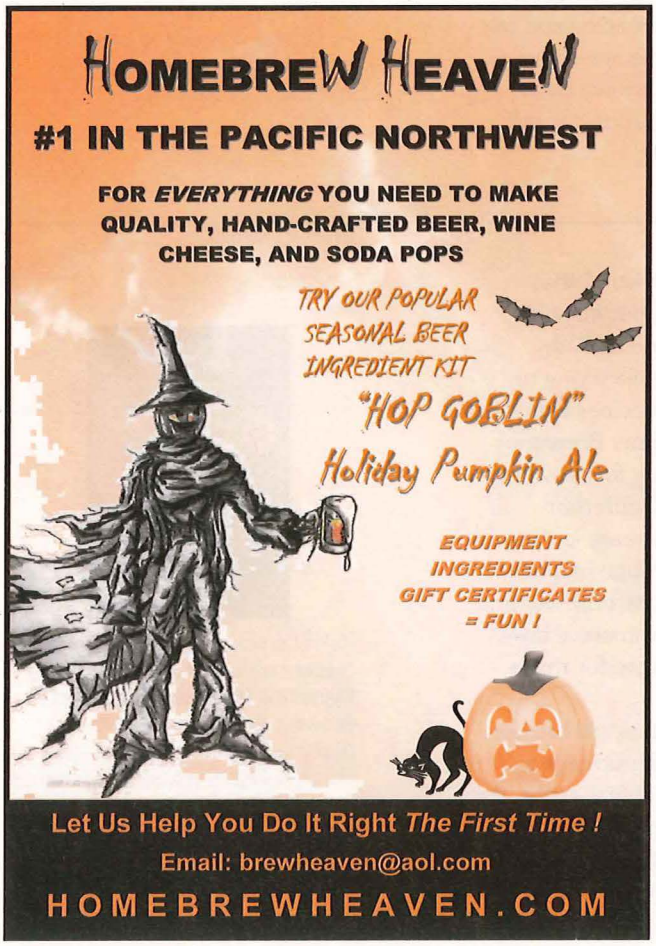
Michael J. Lewis, Professor Emeritus of Brewing Science at the University of California, Davis, as well as the academic director and lead instructor of UC-Davis Extension's Professional Brewing Programs. Michael has been honored with the Award of Merit of the Master Brewers Association of the Americas, elected as a fellow of the Institute of Brewing & Distilling and as a senior member of the International Brewers Guild. He is also a recipient of the UC-Davis Distinguished Teaching award.

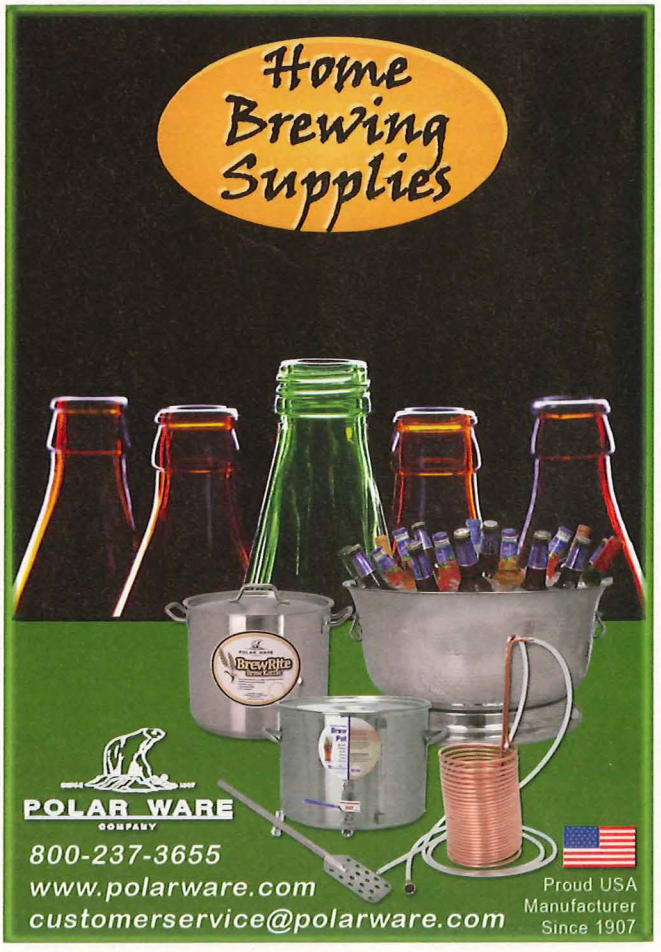
I believe that a brewing student should choose, if possible, a residential program because the onsite interaction with other students, instructional faculty and guest lecturers in a collegial setting is hugely important for a thorough understanding. It's also important to set aside a special time and place for learning the brewing profession without the pressure of daily work. The reputation of the school a brewer attends lasts for a lifetime, so choose the best.

Before attending our classes, we expect our students to be familiar with scientific principles of biology and physics to support our program in brewing science and brewery engineering. This is partly dictated by the advice of the Institute of Brewing and Distilling (London) whose diploma examinations our students take. We prefer a first degree (bachelors) in a science or engineering subject, but aside from that we require college-level courses in at least two of the following subjects for admission: biology, chemistry, physics or engineering.

Something that potential students might not expect is the scientific rigor of instruction, as well as the speed and depth at which subjects are covered. Also, the expectations of performance, demand for excellence and the complexity of brewing blows some students away, especially in the initial phases of instruction. Many students assume their homebrewing or practical experiences make them experts already, and initially are not well-prepared for the expectations of brewing at the professional level.

If you want to study professional brewing, I suggest that you first find someplace to work in a brewery, of whatever size and complexity, that actually makes and sells beer to the public. Make sure you really like the nature of the work, which is often physically demanding, not always pleasant and never easy. Also, make sure you can afford the brewing school experience so that money worries do not distract you from the genuinely hard work of learning the facts and practices of the brewing profession. BYO





Fickle Fermentations

Storing yeast, DIY specialty grains

by Ashton Lewis



Q CAN THE ADDITION OF AMYLASE ENZYME TO A STUCK FERMENTATION SAVE A BATCH OF BEER? I HAVE HAD TWO BATCHES STOP ATTENUATING AT ABOUT 1.030. WHAT ARE THE RISKS/REWARDS OF ADDING ENZYMES (AFTER THE BOIL & COOLING) TO THE WORT? DO YOU RECOMMEND ADDING SOME TO EVERY BATCH OF WORT WHEN PITCHING THE YEAST?

MICHAEL KILLGORE
BEAVERTON, OREGON

A This question relates to Dustin Patterson's question about fermentation rate and Michael Killgore's question in the last column (September 2011) about Beano®. The usual causes of stuck fermentation are all about the little yeasties. Underpitching is probably the number one cause of sluggish and stuck fermentations for homebrewers. Poor aeration is a very close second and is a problem that not only leads to sluggish fermentations but also affects beer flavor by influencing how the yeast cells metabolize glucose. For brewers who push the limits of adjunct use, problems related to nutrient dilution begin to show up, and if the limits of original gravity are pushed high ethanol levels can cause fermentations to stick. Some yeast strains are overly flocculent, especially if the zinc content of wort is too high, and you can have problems in those cases. Finally, overly cool fermentations can be problematic if the fermenting strain is out of its comfort zone.

All of the factors above affect yeast. If you have a stuck fermentation and add amylase enzyme you are not doing anything to affect your yeast. The addition of amylase affects wort fermentability, and in very, very few cases will stuck fermentations result from this property of wort. But for the moment let's assume that your problem is with wort and not yeast. If that is, indeed, the case you need to look upstream of the fermenter for the solution.

If you are an all-grain brewer you need to make sure that your ratio of malt to water is in the normal range of 0.3–0.5 gallons of water per pound of malt (2.5–4.0 liters/kg). In extremely thick mashes it is possible to have fermentability issues because there is insufficient water for starch conversion (a hydrolytic reaction). You should also make sure that you are mashing in the correct temperature range to provide good conversion. For infusion mashing 149–158 °F (65–70 °C) is a safe range. This is obvious advice, but if you are not paying attention to details you can be surprised by the results. One detail related to temperature that is often overlooked is thermometer calibration. Whenever I have a problem that might be related to a weighing, volumetric or temperature error, I immediately suspect the instrument and confirm the accuracy of my tools.

The best way to address your problem is to first review what is happening that affects yeast. If you are satisfied in that department, focus on mashing. If you don't mash, consider using a different malt extract supply. Somewhere you will discover the root cause of the problem.

Notice I have not mentioned adding amylase enzyme to your fermenter. I am not a big fan of adding enzymes in the fermenter because you have no way of limiting the reaction. Even though I did indeed author an article about using Beano® to make light beers back in 2001, it was

"The best way to address your problem is to first review what is happening that affects yeast."

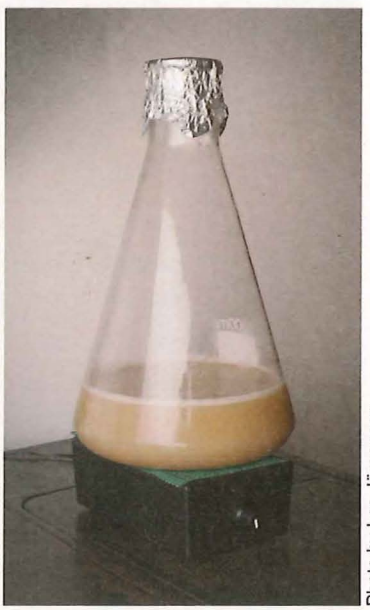


Photo by Les Jörgensen

intended as a joke . . . and yes I actually conducted a little experiment so that I had some data to go along with my joke. This in no way was an endorsement of the idea. The beer that I assaulted with Beano® turned out to be overly dry and had very little left to it. That's how theses fermentations typically turn out. If you want to make a beer with really low residual carbohydrate content and very little body this is the ticket, but most homebrewers are not looking to recreate those types of beers.

If you do add amylase enzymes, it is best to add them to the mash at a temperature where they can be most active and so that they can be denatured during the boil. But even then you need to control their activity, which requires access to lab methods that fall way outside of homebrewing. And even then your root problem has not been addressed.

Q I HAVE JUST STARTED MAKING YEAST STARTERS FOR MY BREWS. I LIKE THAT I CAN CONTINUE TO REUSE THE YEAST I ALREADY HAVE PAID FOR. I AM SELF ADMITTEDLY CHEAP, SO I AM CURIOUS - AFTER MAKING A STARTER IS IT POSSIBLE TO STORE IT LONG TERM? I HAVE SOME LEFT OVER LONDON ALE YEAST SITTING IN MY FRIDGE . . . HOW LONG WILL THAT LAST? IF I MAKE A YEAST STARTER, WHAT COULD I DO TO MAKE IT LAST?

ROBERT HUYLER
LYNDON, VERMONT

A Reusing yeast is certainly one of those things that makes sense from a cost-savings perspective. Indeed, brewers have been harvesting yeast crops at the end of fermentation, temporarily storing the yeast and re-pitching it into subsequent batches for a very, very long time.

One thing that has been demonstrated through research is that brewing yeast is not something found in nature; mutations over thousands of years of brewing have resulted in yeast strains that are only found in breweries. This is really not too different from domesticated animals. Another thing that is known about brewing yeast is that some of the properties strains are selected for by brewers change with subsequent generations. One example is a yeast strain's flocculation characteristic; lager yeasts, in particular, tend to become less flocculent if the yeast is used for too many generations. Some strains change faster than others, but as a general rule most breweries do not continue to reuse yeast indefinitely and new yeast is brought into the brewery by growing cells from some sort of storage



form (liquid nitrogen, freeze dried samples or cultures stored on a growth medium).

The best yeast to reuse comes from a healthy and normal fermentation. Batches that do not ferment normally, or those that have unusual aromas, are not top candidates for cropping. Assuming that you have a batch that is a good candidate for yeast cropping, you need to determine how to harvest the yeast. Most yeast strains, including most ale yeast, will eventually settle to the bottom of the fermenter within a few days following the end of fermentation. I think the easiest way to harvest yeast at home is to rack the beer out of the primary, swirl the yeast up from the bottom of the fermenter and pour it into a clean and sanitized storage container. Most thick slurries harvested in this manner contain about 750 million cells per milliliter.

It is best to store yeast in a vented container because there is a real possibility that the cropped culture will produce carbon dioxide. Do not store yeast in sealed glass containers as this may result in exploding glass containers. I am a proponent of using plugs of cotton batting to close the mouths of Erlenmeyer and Fernbach flasks.

Yeast cells have a finite storage life, and as energy reserves, such as glycogen, are consumed during storage, cells begin to die. The most common method used to extend the storage life of yeast cultures is to rapidly cool the yeast culture and store it somewhere around 32–38 °F (0–3 °C). Some brewers wash yeast with cold water after harvesting to dilute the beer content of the slurry since the alcohol content of beer is detrimental to cells during storage. Yeast can easily be stored for up to a week in this temperature range without losing too much viability in the culture. Anything greater than a week is too long for most commercial brewers because the economic risk of using old and tired yeast cultures is simply too great.

Things are not too different with homebrewing, except the risk of failure. If I am running a brewery that brews 100-barrel batches and ferments these batches in 400 barrel fermenters, the cost of a failed batch is equal to about 20 man hours of work plus about 20,000 pounds of malt and 200 pounds of hops; roughly $8,300 in labor and raw material costs.

At home the cost of failure is perhaps even greater. You spend your hard-earned free time and you pour your heart and soul into crafting that perfect batch of wort. If you want to re-use yeast at home, do not push the limits of storage time and expect anything miraculous to occur. In fact, you should actually expect poor results because that is what you could see.

Q HOW DO I MAKE SPECIALTY GRAINS? I WANT TO START BUYING 25 TO 50 LBS. (11 TO 23 KG) OF GRAINS TO LIMIT THE COST OF GAS TO AND FROM MY STORE. IS IT POSSIBLE FOR ME TO MAKE SPECIALTY MALTS AT HOME, AND IF SO HOW DO I GO ABOUT DOING IT?

JOSHUA COCHRAN
BENTON, ARKANSAS

A Specialty malts fall into a few basic categories defined by the method of production. Higher kilned malts generally include those types that have more color and flavor than pale malts and that are produced using the same type of malt kiln as the "standard" pale malts. Munich, biscuit, amber and Vienna malts are examples of types that are made in the kiln.

Crystal or caramel malts are stewed before drying, although not all maltsters use the term "crystal" and "caramel" in the same fashion. Sometimes the terms are interchangeable and the final cure phase may occur in the kiln or in a roasting drum. The process of stewing is similar to mashing, but the mash occurs within the malt kernel. Stewing is accomplished by heating green malt, that is, malt that has completed germination

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but is not yet dry, to between 140 and 175 °F (60 and 79 °C) in a closed vessel preventing the escape of moisture. Stewing converts starch into sugar and also increases the amino acid content by proteolysis.

After the stewing phase is complete the malt is kilned, where the final temperature used in kilning — often termed the cure temperature — and cure time is altered depending on the degree of color development desired. Crystal malts are often made in roasting drums because the stewing and kilning process is easier to control. An older method, rarely used today, was to begin with kilned malt and rehydrate the grain to achieve a moisture content of about 45%. This was followed by stewing and kilning to produce crystal malts.

Roasted specialty grains include materials like chocolate, brown and roasted malt and roasted barley. These ingredients get their intense colors and flavors by using final cure temperatures up to 400 °F (200 °C) for times up to 90 minutes. Roasting drums are always used for these products and the roasting process is quickly terminated by using water sprays to "quench" the roasted materials before the roaster is emptied. One practical concern when producing highly roasted materials is avoiding fires.

Start out with high-kilned types, like those produced on a drying kiln. A convection oven is a great tool for making specialty malts because one of the key features of a commercial malt kiln is forced air. Without forced air you will have temperature gradients throughout the malt and will get inconsistent results from kernel to kernel. In addition to a convection oven, you will also need some sort of drying tray that you can load the malt into and place in the oven. You can make your own drying tray using a box frame and stainless steel screen mesh. Do not use any material that could be a fire hazard for the frame, however.

Crystal malts would be a natural next step to try. Adjusting the moisture content of dry malt can easily be estimated by simply adding a known weight of water to the malt you wish to rehydrate. The stewing process could be carried out in a covered stock pot in your oven. After the malt is stewed you can turn it out on your drying rack and begin the kilning process in your convection oven. Make sure you read up on kilning methods; the kilning temperature used to dry malt is lower than the cure temperature and maltsters often use a temperature profile to achieve even drying with minimal color-pick before the final cure temperature is met with the goal of producing color and flavor. As far as roasted grains are concerned, I would suggest buying those unless you have a small coffee roaster. BYO



Maibock/Helles Bock

Make it clean and malty

by Jamil Zainasheff



I have always been a fan of German-style lagers. In fact, my love of the always-present clean malt character in these beers is what made me choose the nickname Mr. Malty. Everything from the crisp Pilsners to the rich bocks relies on clean, bready malt character (not necessarily malt sweetness) as a critical component of these styles.

Maibock (also known as Helles bock) is in the middle of the German style pack. It has that rich continental malt character, both in flavor and aroma, but it is never overly sweet. It has a moderately dry finish, leaving an impression of dough-like, grainy or even slightly toasty malt character. There is a hint of malt sweetness, but it is often balanced with light hop bitterness and enough attenuation to make it easy to drink a liter. A Maibock should always be brilliantly clear with a golden hue and the body should be medium. Any alcohol should be smooth and slightly warming, never hot or solvent-like. The fermentation character is clean, and very low in esters.

Maibock is also somewhat in the middle when it comes to hop bittering and character. The bittering is more balanced than in the other bock styles, which tend to have a sweeter balance. The hop flavor and aroma is higher in Maibock than the other bock styles as well, but not as high as you might find in a German Pilsner. The hop aroma, if present, is subtle and has a spicy or sometimes floral quality. In the past some people believed that there was a difference between Helles bock and Maibock, with one being slightly hoppier and higher alcohol than the other. Today most people consider the names to be synonymous.

A great recipe is relatively simple, but many brewers try to make it much more complex in an effort to increase malt character. The best way to achieve that great German lager malt character is with high-quality, full-flavored base malts and excellent fermentation practices. I would never attempt to make a Maibock without using continental Pilsner malt. You can use other pale base malts if you have no other option, but the light, grainy taste of high quality Pilsner malt is right on target for this style. In addition, a good portion of the grist should be Vienna or Munich malt, which adds to the rich malt character.

Anywhere from ¼ to ½ of the grist can be Vienna or Munich — but don't go overboard . . . too much Munich can cause the color to lean more toward orange than golden. With those basic malts you should be able to make an excellent example of the style, but if you must, you can add other malts as well, such as head and body forming dextrin malts. I have seen some recipes calling for crystal malts, but those are inappropriate in this style. Unlike the other bock beers, this style is best brewed without caramel malt. Caramel malt adds the wrong flavor and sweetness. You want some residual sweetness, but more of a base malt sweetness than a caramelized sweetness. Trust that the higher starting gravity and mash technique will leave just the right touch of sweetness, which will not be nearly as heavy as adding caramel malt.

Extract brewers will need to use some Munich extract or do a partial mash with Munich or Vienna malt. Most Munich malt extract is sold as a blend of Munich and Pilsner (or other pale malts) in different percentages. I specify 100% Munich liquid malt extract (LME) in my recipes so you will know which blend to use for your brew. If you use a blend with a higher percentage of Munich than the recipe you are brewing, you can always add some Pilsner extract to reduce the overall amount of Munich in the beer. That said, most Munich extract blends are often close enough for a decent Maibock without any adjustment. The only supplier of 100%

Maibock/Helles Bock
by the numbers

OG:	1.064–1.072 (15.7–17.5 °P)
FG:	1.011–1.018 (2.8–4.6 °P)
SRM:	6–11
IBU:	23–35
ABV:	6.3–7.4%



Photo by Charles A. Parker/Images Plus

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

OG = 1.070 (17.1 °P)
FG = 1.017 (4.3 °P)
IBU = 27 SRM = 7 ABV = 7.1%

Ingredients

9.3 lb. (4.2 kg) Best Malz Pilsen or similar continental Pilsner malt 2 °L
5.1 lb. (2.3 kg) Best Malz Munich malt 8 °L (or similar)
5.85 AAU Magnum hops (0.45 oz./13 g at 13% alpha acids) (60 min.)
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 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete, which may take 90 minutes or more at this low temperature. 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 1.054 (13.4 °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 Irish moss or other kettle finings with 15 minutes left in the boil. While the recipe does not call for it, you can optionally add another 0.42 oz (12 g) of Hallertau hops at 10 minutes left in the boil to enhance the hop character. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 500 billion cells, which is 5 packages of liquid yeast or one package of liquid yeast in a 15-liter starter.

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).

Maibock
(5 gallons/19 L, extract only)

OG = 1.070 (17.1 °P)
FG = 1.017 (4.3 °P) IBU = 27
SRM = 7 ABV = 7.1%

Ingredients

6.6 lb. (3 kg) Pilsner liquid malt extract 2 °L
3.3 lb. (1.5 kg) Munich liquid malt extract 9 °L
5.85 AAU Magnum hops (0.45 oz./13 g at 13% alpha acids) (60 min.)
White Labs WLP833 (German Bock Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Add enough water to the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and the gravity is 1.059 (14.6 °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 1 hour after adding the first hops. Add Irish moss or other kettle finings with 15 minutes left in the boil. While the recipe does not call for it, you can optionally add another 0.42 oz (12 g) of Hallertau at 10 minutes left in the boil to enhance the hop character. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 500 billion cells, which is 5 packages of liquid yeast or one package of liquid yeast in a 15-liter starter.

Follow the remaining fermentation, conditioning and packaging instructions from the all-grain recipe.

Munich extract that I am aware of is Weyermann.

I like to avoid any work that I don't feel improves the beer, so I prefer a single infusion mash. Perhaps, historically, 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 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).

Hops can be a bit more apparent in Maibock than other bock styles, but it is still fairly restrained with the hop flavor and aroma acting as subtle background notes. Hop bitterness is also slightly higher in this style, but again it requires restraint — just enough to balance the malt sweetness. I really like using German-grown Hallertau hops for flavor and aroma, though sometimes they are hard to source. 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 varieties of hops, you do have some flexibility.

The trick is 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. It is really the overall impression that matters. 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 always be close to even. The

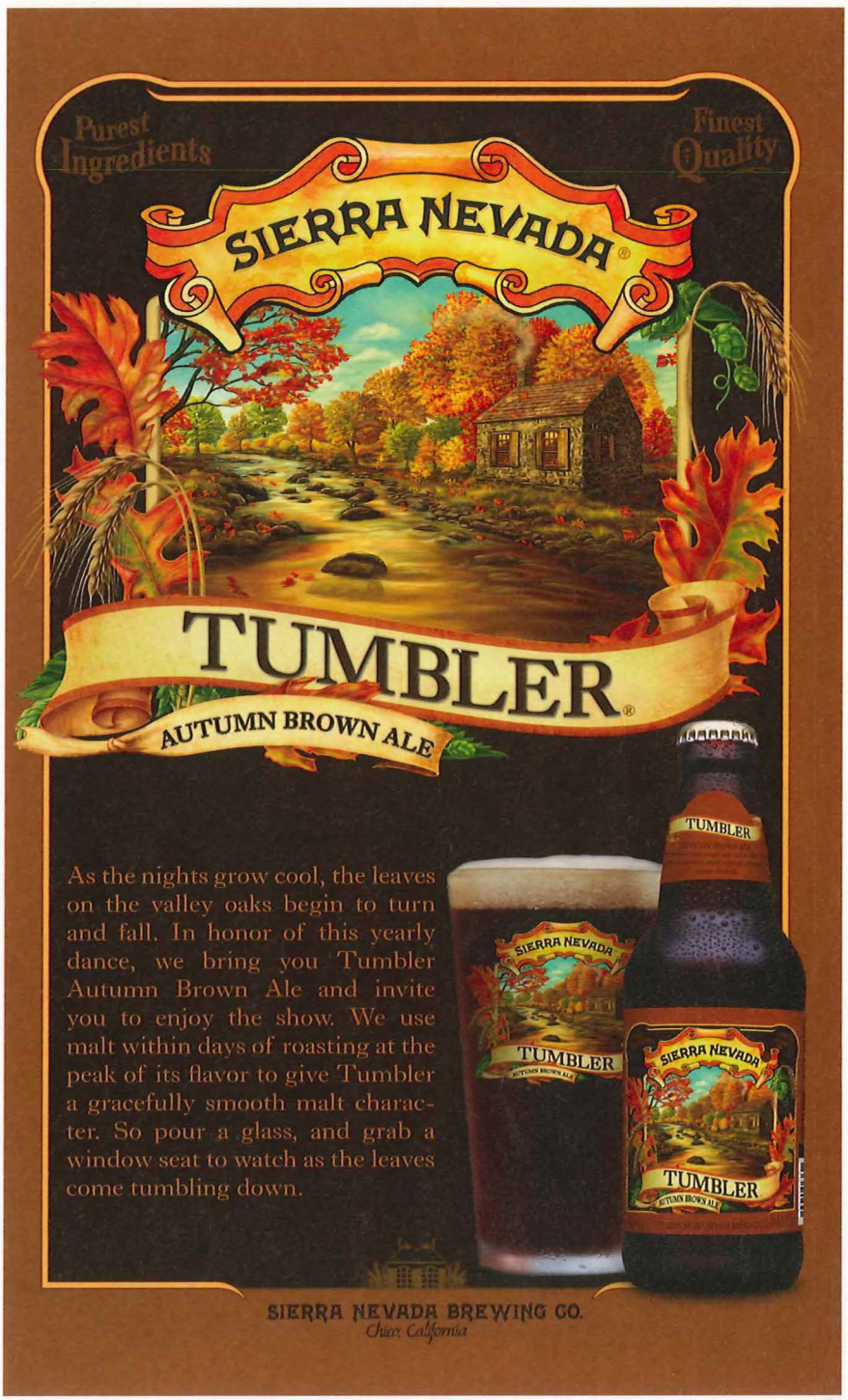
> "Maibock is also somewhat in the middle when it comes to hop bittering and character. The bittering is more balanced than in other bock styles, which tend to have a sweeter balance."

bitterness to starting gravity ratio (IBU divided by the decimal portion of the specific gravity) ranges from 0.3 to 0.6, but I like to target around 0.4. Restrict your late hops to small additions. In general, 0.5 oz. (14 g) during the last 10 minutes of the boil for a 5 gallon (19 L) batch is the most you can use without overdoing the hop character. If the beer is going to lager for a long time before drinking, then you might get away with a little more.

You can ferment Maibock with almost any lager yeast, though my favorites are White Labs WLP833 German Bock Lager and Wyeast 2206 Bavarian Lager. You will find that each lager yeast will emphasize different aspects of the beer. Some will have more malt character and some more hop character, but all can produce an excellent bock with proper fermentation.

While this style is a bit higher in alcohol than most lagers, the beer should never be hot or solvent-like. A gentle warming when you drink the beer is OK, but anything more is considered a flaw. It is important to control the fermentation temperature and to pitch plenty of clean, healthy yeast.

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 create during the early phase of fermentation. Once the growth phase of fermentation 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. 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 to 1 °P) prior to reaching terminal gravity. Brewers often 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.

> "I really like using German grown Hallertau hops for flavor and aroma, though sometimes they are hard to source. Other German grown hops, such as Tettnang, Perle or Tradition, work well also."

It seems that every beer 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 cer-



Maibock/ Helles Bock Commercial Examples

Ayinger Maibock
Brauerei Aying
Aying, Bavaria
www.ayinger.de

Boss Tom's Golden Bock
Boulevard Brewing Co.
Kansas City, Missouri
www.boulevard.com

Cabin Fever
New Glarus Brewing Co.
New Glarus, Wisconsin
www.newglarusbrewing.com

Dead Guy Ale
Rogue Ales
Newport, Oregon
www.rogue.com

Hells Bock
Rock Art Brewery
Morrisville, Vermont
www.rockartbrewery.com

Hofbräu Maibock
Staatliches Hofbräuhaus
(Hofbräu München)
Munich, Germany
www.hofbraeu-muenchen.de

Maifest
August Schell Brewing Co.
New Ulm, Minnesota
www.schellsbrewery.com

Narragansett Bock
Narragansett Brewing Co.
Providence, Rhode Island
www.narragansettbeer.com

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

Southampton May Bock
Southampton Publick House
Southampton, New York
www.publick.com

St. Boisterous
Victory Brewing Co.
Downingtown, Pennsylvania
http://victorybeer.com

tain 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 Brew Your Own *and is the host of "Can You Brew It" and "Brew Strong," both found on* The Brewing Network *(www.the-brewingnetwork.com). Jamil recently started his own commercial brewery, Heretic Brewing Company, in the San Francisco Bay area of California. Turn to the Brewing Education story on page 30 for more about his decision to go pro, and be sure to follow his* Brew Your Own *blog on the Web at www.byo.com/blogs/blogger/Jamil/*

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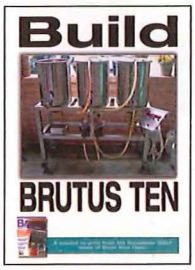
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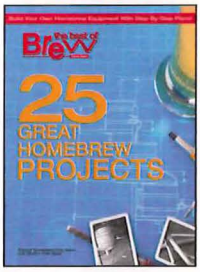
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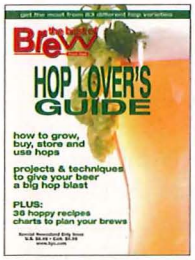


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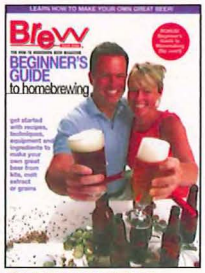
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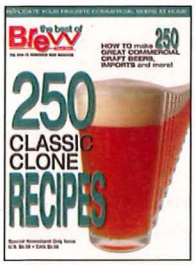
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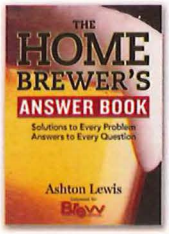
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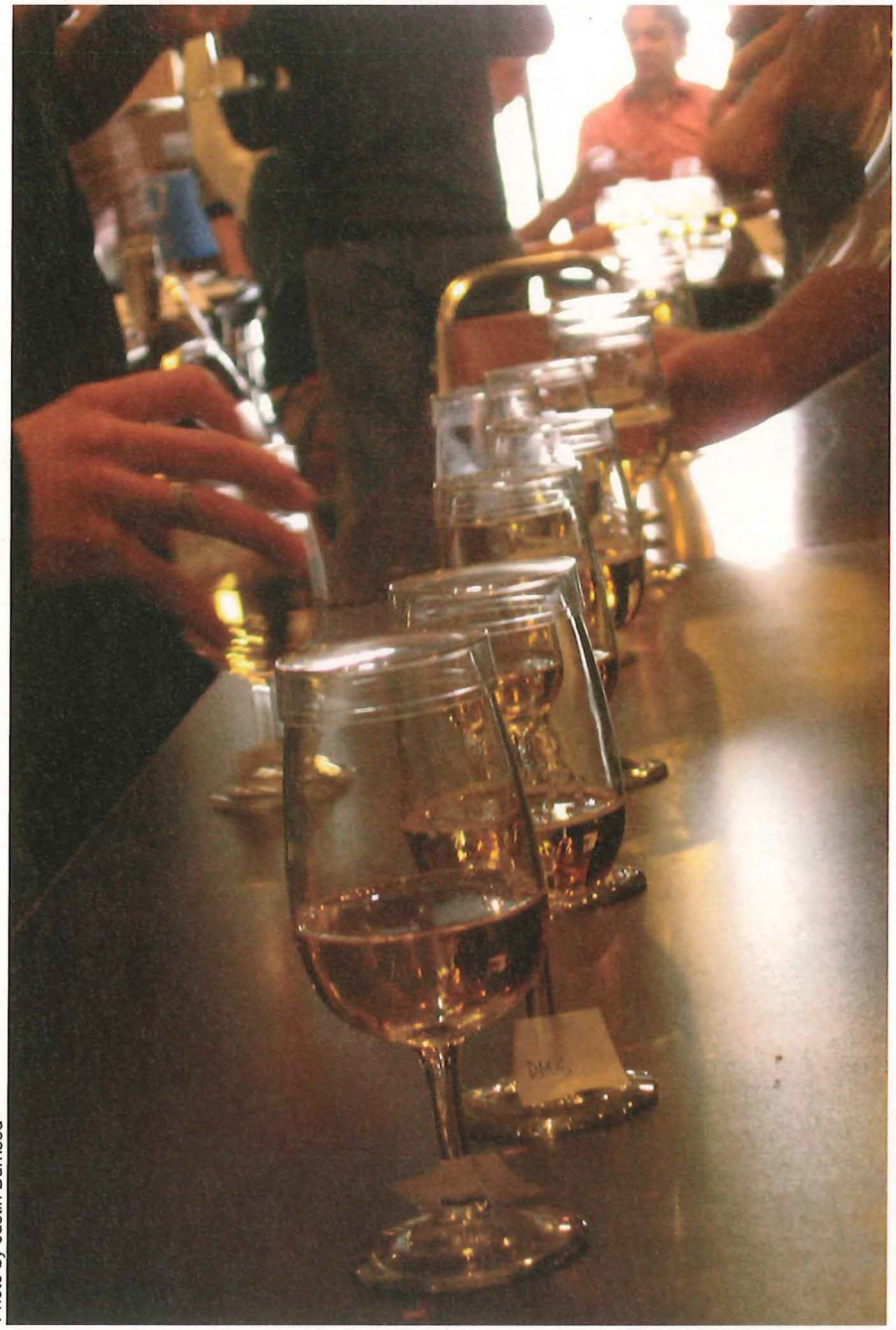


Photo by Justin Burnsed

Homebrewing is an art, pure and simple. Just like any other creative passion in this world, it takes a certain amount of innate ability to brew a beer that people can appreciate. At one point or another, this fulfilling way to spend your free time can morph into something more. You begin to crave a greater understanding of your chosen labor of love. There is a reason that institutions like the Academy of Arts and the Culinary Institute of America exist. They provide education in their respective fields to those that seek to take their skills to the next level. Thanks to the demand by those who thirst for more than just their next beer, we too have options when it comes to a brewing education.

There are many routes one can take to best satisfy this need for brewing knowledge. The first questions that need to be answered are, what are your educational goals and how do you plan to use them? Most people will fall

In brewing school, class time may mean beer time. Sensory analysis of beer is an important part of a brewing education. You need to taste a lot of bad beer in your quest to produce consistently good beer.



Photo by Steve Parkes



Photo by Justin Burnsed

into one of three categories: 1.) Those who want to become better homebrewers 2.) Those that are seeking a career in the brewing industry 3.) Those looking to advance an existing career in brewing. Determining which group you belong to will help you decide which program is appropriate.

The next important question is how much time and resources are you willing to devote to this endeavor? As with many other educational programs, the greater the duration and the more advanced the curriculum is, the higher the tuition costs will be. Some schools will include the cost of books, lab materials and other miscellaneous items in with their tuition and others will not. For the casual homebrewer, brewing courses can be found at select community colleges or if you are lucky enough to live nearby, the more prestigious schools like UC Davis and the Siebel Institute. These courses can be as simple as how to make better beer at home and can be as complicated as teaching you professional lab techniques for beer analysis. Some classes can be as short as a few days and only cost a couple hundred bucks. Others may take an entire semester to complete.

Let's now focus on the people that really want to unlock that door to the brewing industry. Full-fledged brewing programs range in duration from 2 weeks to 4 years. The cost can be as low as $3,600 for a short program and as high as $30,000-$40,000 or more for the more advanced programs when you throw in living expenses. Don't let this frighten you as there are many options that fall in between these extremes. The intensity of the program can vary as well. Some will require your presence in the classroom up to 40 hours a week in addition to the time you put into studying. Others are available in DVD and online format which allow you the freedom to learn from the comfort of your own home.

In addition to the aforementioned money and time that it takes to make brewing school a reality, there are a couple other factors that may come



Photo courtesy of Siebel Institute of Technology

Whether turning pro or just aiming to be the best homebrewer you possibly can, brew school can take you there.

Upper left: Students at the American Brewers Guild pose for a class photo. The programs at Amercian Brewers Guild combine distance learning with on-site practical experience.
Upper right: The University of California at Davis runs its own brewery (Sudwerk), where students get hands-on learning to supplement their academic studies.
Lower photo: Students at Siebel Institute of Technology listen to a lecture. Siebel has a wide variety of programs for different educational aims.

Brewing Schools

American Brewers Guild
Salisbury, Vermont
Phone: (800) 636-1331
Fax: (802) 352-4641
Website: www.abgbrew.com
Programs:
Craft Brewers Apprenticeship (CBA): $8,950 (7 months)
Intensive Brewing Science and Engineering (IBS&E): $6,750 (6 months)

Doemens Academy
Munich, Germany
Phone: +49 (89) 85805-0
Fax: +49 (89) 85805-26
Websites: www.doemens.org
www.worldbrewingacademy.com
Programs:
Brewing and Beverage Technologist: $16,000 (2 years)
Brewmaster Program: $8,000 (1 year)

Edith Cowan University
Joondalup Campus
Perth, Australia
Phone: +(61 8) 6304 5727
Fax: +(61 8) 6304 5633
Website: http://www.ecu.edu.au/future-students/overview
Programs:
Graduate Diploma of Brewing: $24,500 (1 year)

Heriot-Watt University
The International Centre for Brewing and Distilling
Edinburgh, Scotland
Phone: +44 131 449 5111
Website: http://www.sls.hw.ac.uk/research/international-centre-for-brewing-distilling.htm
Programs:
$ 15,000–18,000 per academic year for all programs below:
BSc (Hons) Brewing and Distilling (4 years)
Postgraduate Diploma in Brewing and Distilling (9 months)
Postgraduate MSc in Brewing and Distilling (1 year)
Postgraduate Diploma/MSc in Brewing and Distilling (2–7 years)
MBA in Brewing and Distilling (2–7 years)

Master Brewers Association of the Americas
St. Paul, Minnesota
Phone: (651) 454-7250
Website: http://www.mbaa.com/
Programs:
Brewing and Malting Science: $3,650 (2 weeks)
Brewery Packaging Technology: $3,775 (2 weeks)
Note: Preparatory courses for the IBD exam.

Niagara College
Niagara on the Lake, Canada
Phone: 905-641-2252
Websites: http://www.niagaracollege.ca/content/Programs/WineryViticultureStudiesCFWI/BrewmasterandBreweryOperationsManagement.aspx
Programs:
Brewmaster and Brewery Operations Management: $8,300 (1 year)

Oregon State University
Corvallis, Oregon
Phone: 541-737-6486
Website: http://oregonstate.edu/dept/foodsci/undergrad/fermopt.htm
Programs:
Bachelor in Fermentation Science: resident (per term) $2,582, non-resident (per term) $7154 (3 years)
Note: Graduate studies are also available.

Siebel Institute of Technology
Chicago, Illinois
Phone: (312) 255-0705
Fax: (312) 255-1312
Website: www.siebelinstitute.com
Programs:
International Diploma in Malting and Brewing Technology: $14,900–16,400 (3 months)
Master Brewer Program: Sold out through 2012; tuition for 2013 TBD (5 months)
Associate in Malting and Brewing Technology: $8,800–7,900 (6 weeks)
Note: Siebel offers many additional courses for all levels of brewing.

University of California at Davis
Davis, California
Phone: (530) 757-8899
Website: http://extension.ucdavis.edu/unit/brewing/
Programs:
Master Brewers Program: $14,300 (5 months)
Professional Brewers Certificate Program: $8,800 (2 months)
Note: Programs above are preparatory courses for the IBD exam. UC-Davis also offers undergraduate and graduate degree programs as well as other courses for all levels of brewing.

Versuchs- und Leranstalt für Brauerei
Berlin, Germany
Phone: +49 30 450 80-298
Website: https://www.vlbberlin.org/en/brewmaster
Program:
VLB Brewmaster Certificate: $19,800 (6 Months)

into play when it is time to apply for admission. Due to the recent boom in the craft brewing industry and the high demand for well-educated brewers, many of the more popular schools have waiting lists. I know a few of the more popular programs are already booked through 2013. Depending on your level of patience, availability may play a role in which one you end up choosing. Most of the programs do not require you to have any previous experience or any scientific background. However, in the case of the UC Davis Master Brewers Program and the American Brewers Guild Craft Brewers Apprenticeship Program, you are required to fulfill certain math and science criteria before they will accept your application.

The format of how the curriculum is taught is also program specific. Some are heavy on the science/theory and just dabble a bit with hands on learning, while others are the exact opposite. Here's where you have another decision point as to which type of education you want. Would you like to focus on fermentation science, thermodynamics, and sensory evaluation in the classroom and get an internship later to provide practical experience? Or would you rather get your hands dirty at your school of choice and read up on the finite details of brewing science later on down the road?

Which way you go will depend on whether you have any previous experience in professional brewing and what type of learning environment you best respond to. I also want to point out that not every career in brewing leads to being a brewer. Some people end up going into packaging, cellaring, quality control or work as a brewery lab tech. Again, your own personal goals will have a big impact on what best suits your needs.

One of the more interesting choices you have during this selection process is whether to go to school in North America, Europe or Australia. There are very good brewing schools located in Australia, Germany, the UK and Canada. Most of them offer programs that are taught in English, but you may want to double check before

applying to them. If you want to get an education on two continents, you may want to look into the Siebel Institute's Master Brewer Program. The first 8 weeks are taught at their campus in Chicago. Then you get to spend the last 12 weeks at the Doemens Academy located in Munich, Germany. Pretty cool!

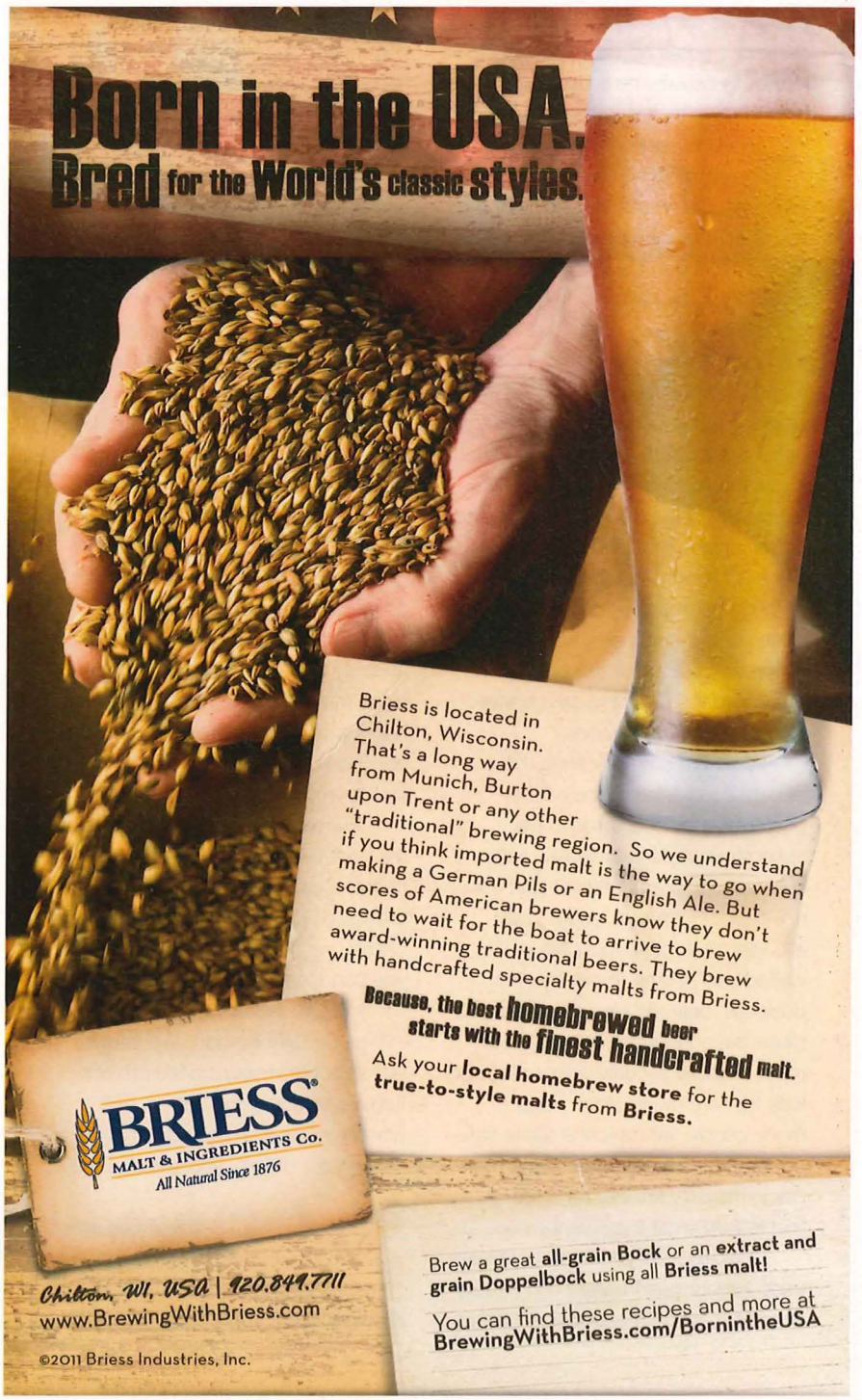
If you are more inclined to study in the U.S., there are certainly some world class schools here as well. The Siebel Institute and UC-Davis both offer Master Brewer Programs, as a stand alone, complete brewing education. In addition, you also have the option to enroll in subsections of these programs if only part of them suit your needs. If you really want to get deep down into how important yeast is to brewing, UC-Davis and Oregon State University both have bachelor's and graduate programs in fermentation science and food science. There are also multiple brewing education options offered by both the Master Brewers Association of the Americas (MBAA) and the American Brewers Guild.

Now that we've covered what you can expect prior to acceptance into one of these brewing programs, let's quickly go over what can help you succeed once you arrive. Being part of the 2011 graduating class of the UC-Davis Master Brewer Program, I do have a bit of insight I'd like to share with you. First and foremost is to be excited! You are about to embark on a journey that many people will be jealous about for years to come. Secondly is to be sure that you have gotten all of your resources lined up so you can pay for the program on time. I stress this because there were lots of candidates on the waiting list ahead of me that did not do this, and hence I was able to get in. Another thing you should be aware of is that U.S. Federal Student Loans cannot be used for these programs, with the exception of a bachelor's degree in fermentation science. There are private student loans out there you can apply for, but they are very costly.

Prior to classes starting, there are a few things you can do to really prepare yourself for the onslaught of information that will be thrown at you.

1. Get any and all practical experience you can. Everyone and their mother would like to have a job at a brewery, right? The people that run your local brewery have probably heard "Dude, can I get a job here?" at least a thousand times. When you approach your local brewmaster, tell him or her that you want to get any hours you can as an intern and work for free. Be sure to mention your acceptance to your brewing program of choice so they'll know how serious you are. Working for free stinks, but if it's your passion, then it'll be worth it. You may have to bug them at least a half dozen times as well.

2. Read, read, read! I know this is a cliche, but knowledge is power. Prior to starting classes, I read at least a dozen books that touched on topics from the



Why Go Pro?

Most homebrewers eventually have someone ask them, "Why don't you open a brewery?"

It is a common question and one that we often answer with lots of reasons why we don't. Usually the excuses are all centered around money such as, "I have a decent job that allows my family to eat each day" or "I can't come up with enough money to buy my next batch of homebrew supplies, where do I get the money to open a brewery?"

The same thing happened to me. When people would ask, "Why don't you start your own brewery?" I would reply with, "I don't want to ruin a great hobby by turning it into hard work." But the reality was that I let the issue of money stop me. I clung to the financial security of my soul-crushing job in software engineering, but in the back of my mind my "what if" dreams lived on. Finally the day came when I left my software job and an opportunity to open a brewery came up shortly thereafter.

I do get many emails from people asking about a career in brewing. Either they want to know how to break into the business as a brewer or how to start a brewery.

While I'm currently living the dream, don't think of me as the poster boy for how to do it. My strength is working tirelessly until I achieve a goal, but I think I lack the risk-taking gene that would have allowed me to take this path earlier. I waited a long time to get into the business, only allowing myself to make the change once I had much more financial security, lower risk, and kids that are much older. I doubt many people will have the same safe opportunity that I did, so taking more risk is the only answer for them, if that is truly what they want to do.

The question you need to answer deep in your heart before you should commit to being a professional brewer isn't, "Do you love craft beer?" but, "Do you love the craft beer industry?"

If you are basing your interest in professional brewing solely on a love of craft beer, then you shouldn't make the move. Stick with homebrewing until you have a chance to learn more about the craft beer industry. It is filled with wonderful people that have a great sense of community and sharing, but one thing most of those people have in common is working long, hard hours for little money.

When it comes to making beer and selling it, the challenges are many and it can be frustrating. Craft beer is a business and if you have romantic notions that don't include the harsh realities of running a business, you are going to be unhappy. Likewise, if your main thoughts are about the profit potential of craft beer, then you are not going to be happy either. If you get excited about working with other creative and interesting people that are passionate about great beer, then maybe you are headed in the right direction.

I enjoy the craft beer community enough that I would have found my niche in it regardless, even if I hadn't had the opportunity to open a brewery. It is something that I love and that is why it was a good change.

There are many ways to get into the craft brewing industry. You can try to find a job in an existing brewery or brewpub, you can get a brewing education and then start your job hunt or you can start your own brewery.

My only regret is that I didn't do this earlier. Life is short. We should not shirk our responsibilities to our families or our communities, but when you have an opportunity to chase your dream, you should take it.

— Jamil Zainasheff

Jamil is the founder of Heretic Brewing Co. in Pittsburg, California.



business side of brewing, fermentation science, style guidelines, ingredients, to the history of brewing in America. You want to know what's funny? I probably learned the most from my three favorite homebrewing books: "The Brewmaster's Bible," by Stephen Snyder, "Dave Miller's Homebrewing Guide" and "The Home Brewer's Answer Book," by Ashton Lewis (*BYO*'s Mr. Wizard).

3. Take a couple of science classes. Perhaps you already have a science based degree and won't need this part. For the rest of us who majored in something not applicable to brewing or haven't done a stint in college yet, this is a good idea. If there is one class that I can honestly say will give you a much better understanding of fermentation science than if you had never taken it, hands down it would be organic chemistry. I know it can sound very intimidating, but trust me on this. I hadn't taken anything chemistry related for 15 years and after taking a summer school class in general chemistry at the local community college, I moved on to

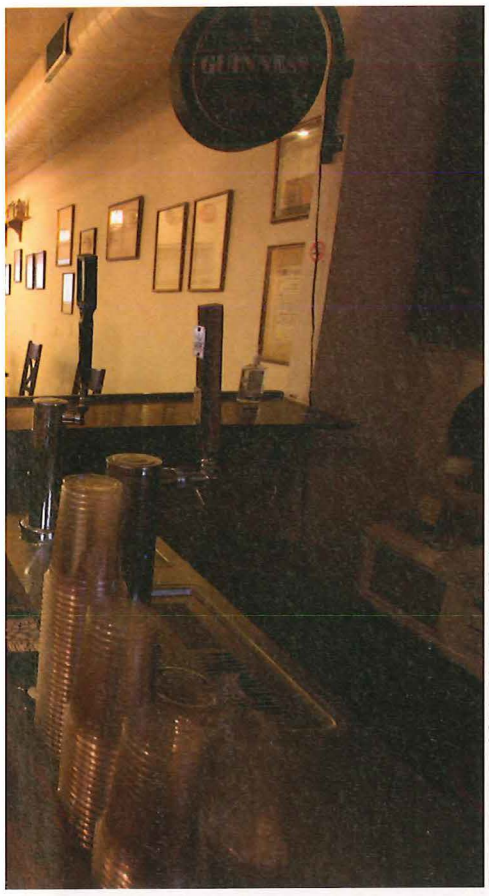


Photo courtesy of Siebel Institute of Technology

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The content at different brewing schools varies, because students are looking for different experiences. Some programs stress academic work over practical experience or vice versa, but most combine elements of both. Some short programs contain material specifically tailored to homebrewers; others are only suited for those who want to go pro or to extend their education as brewing professionals. In some programs, the aim is to prepare students for a brewing certification test.

You'll get the most out of brewing school if you're clear about what you expect to learn and select a program that matches your needs.

organic chemistry in the fall and it was a breeze. It's amazing what you can do when you relate it to beer! A class in microbiology would also be helpful.

4. Brew, brew, brew! Your homebrewing should not, I repeat, not take a hiatus once you get into brew school. In fact, it should be just the opposite. There are a ton of parallels between brewing at both levels. The more you do it, the more you will understand it.

Here's a little tid bit most people

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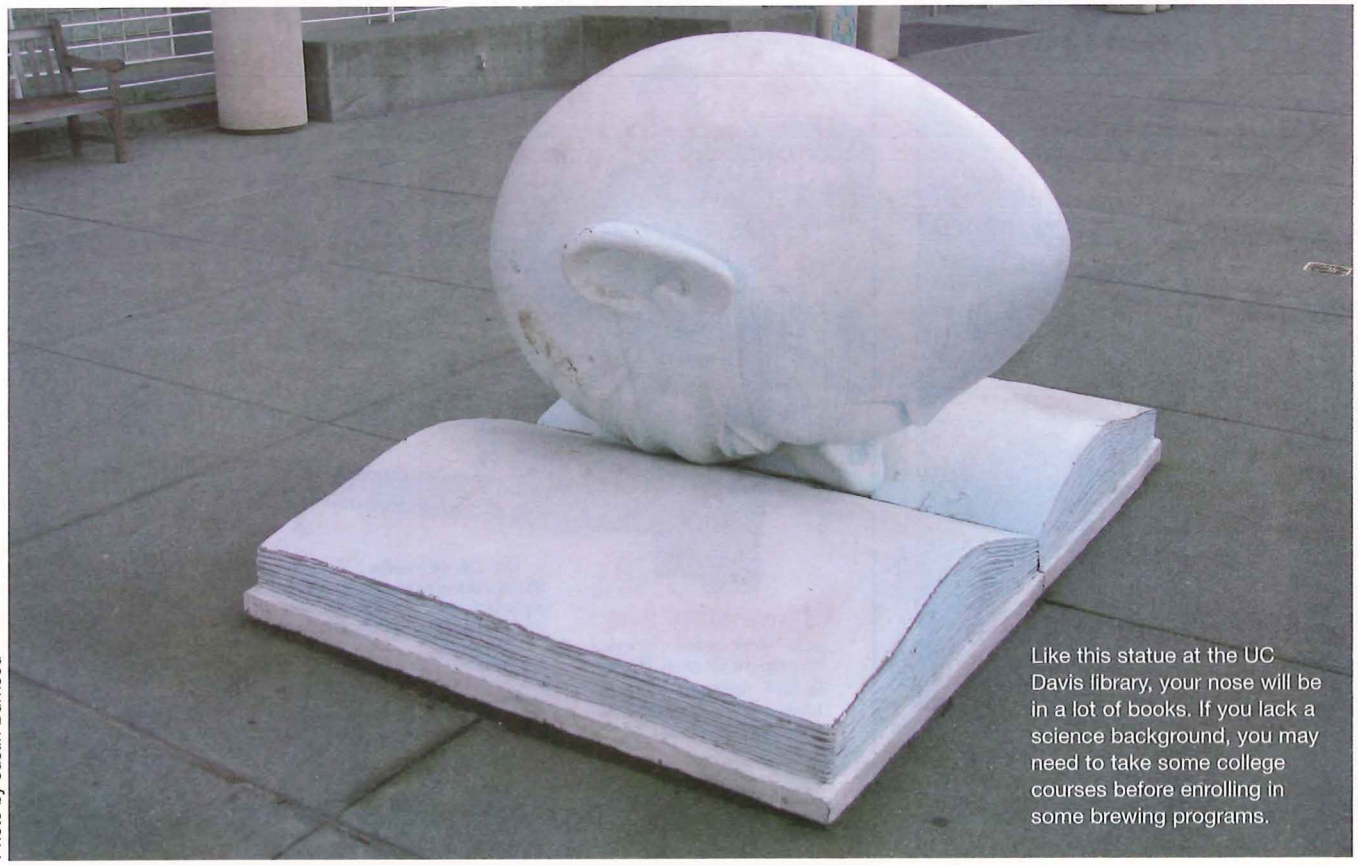


Photo by Justin Burnsed

Like this statue at the UC Davis library, your nose will be in a lot of books. If you lack a science background, you may need to take some college courses before enrolling in some brewing programs.

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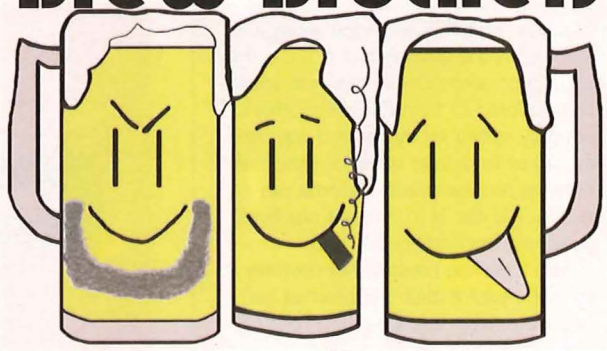
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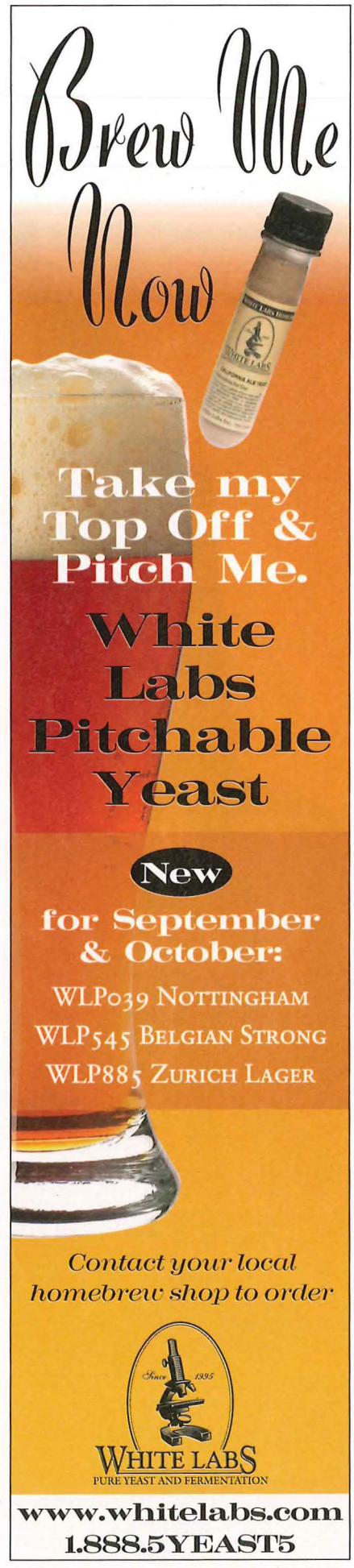
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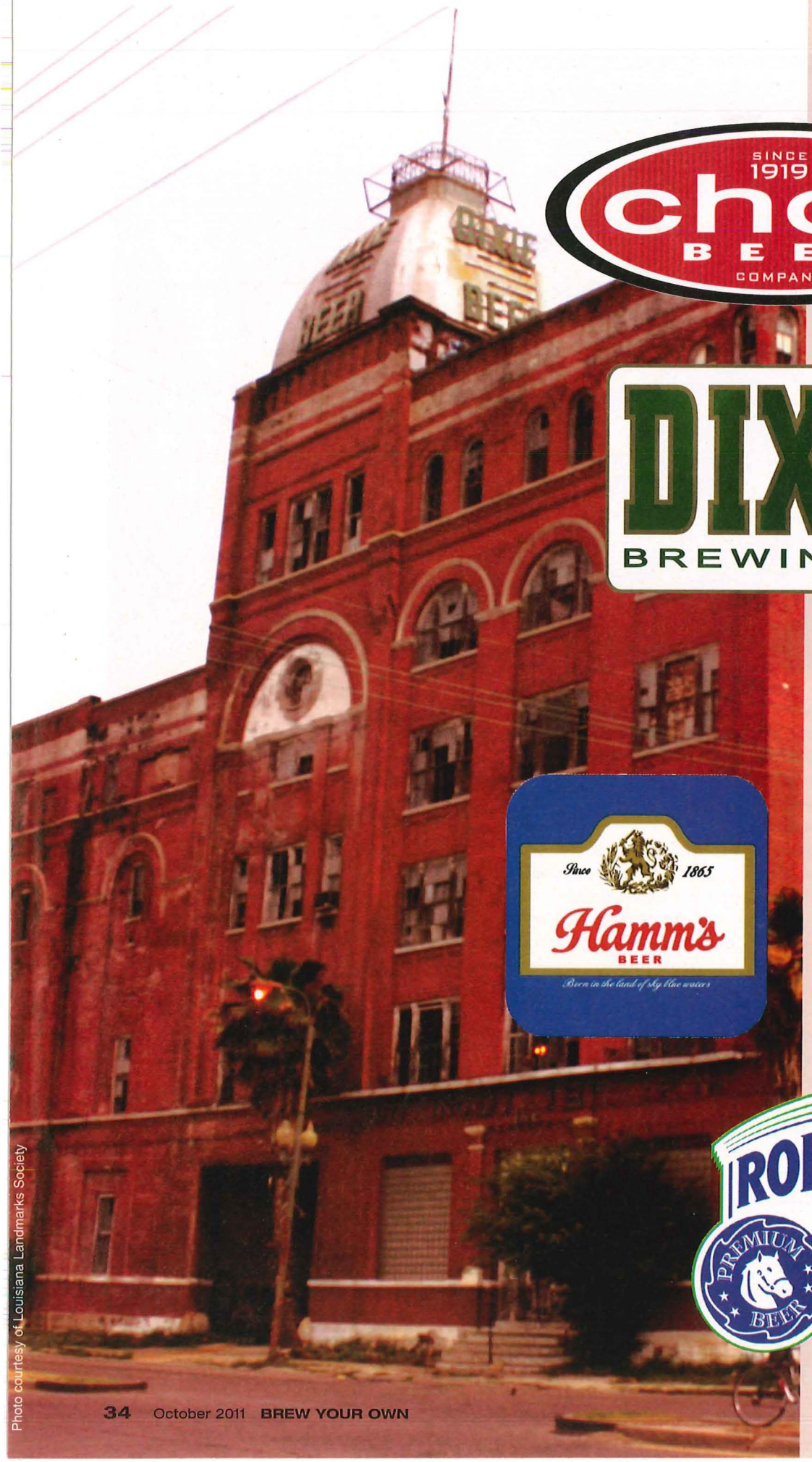
don't know about brew school. For the most part, there is little to no curriculum on recipe formulation. Gaining knowledge on that is going to be mostly up to you. So if you plan on opening your own little nano-brewery, better get those recipes ironed out now! I should also mention that some of these programs are designed to prepare you for the Institute of Brewing and Distilling (IBD) General Certificate in Brewing, General Certificate in Packaging or the Diploma in Brewing examinations. Their curriculum will be tailored to give you the knowledge you need to pass one of these exams. If successful, you will have earned a professional certification that is recognized by the international brewing community. I had the pleasure and the painstaking task of taking the Diploma in Brewing exam in 2011. It is a 9-hour, 3-part exam that requires you to write two papers on various brewing science topics and one paper on engineering/packaging. It was the most difficult test I have taken in my entire life. Thankfully I put in the time, had great professors and peers that helped me get through it. If the program you choose includes one of these tests, prepare to be challenged!

> If you are interested in brewing school, be aware that you aren't the only one. Courses can fill up quickly, so plan ahead. A formal education will give you an edge in the crowded field of people who want to become pro brewers.

If this article has sparked your interest in getting a formal brewing education, the next step is to do some research on your own. In the sidebar on page 28, I have provided information on a variety of schools and programs to get you started. Check out their websites and don't be afraid to give them a call. Most people involved in this industry, including the academic side, are pretty down to earth and are willing to share their knowledge to help guide you. If you want to know more about what life is like at brewing school, check out my blog at: www.byo.com/blogs/tags/UC-Davis-brewing BYO

Justin Burnsed is a frequent contributor to Brew Your Own.





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Retro Regional Beers

Story by **Lisa Morrison**

Times were tough "back in the day." Grandpa had to walk 10 miles to school. Uphill. Both ways. And they only had black-and-white TV. Sticks and rocks were their toys. Yeah, we've heard it all before. But the real hardship was that Grandpa (and Grandma) only had a few beer brands to choose from in the era when a few local breweries were becoming larger regional ones and many smaller ones were going away. U.S. beer was almost completely homogenized down to a style that we now call American lager or American Pilsner. But if you ask Grandpa about his favorite beer, the talk about hardship fades away and his eyes grow soft misty. He smiles as he remembers those beers of old. While those old-school beers lacked a lot in variety and flavor, they do have a rich history. Here's a closer look at a few regional favorite beers of yesteryear from around the country, followed by clone recipes so you can make them at home.

Olympia: It's the Water

Olympia Brewing Co. got its start in Tumwater, Washington, as Capital Brewing Company when a German immigrant from Montana named Leopold Schmidt — who had already established a successful brewery in Big Sky Country — set up an ice factory powered by the Tumwater Falls on the Deschutes River. There, he also built a four-story brewery and a bottling and kegging plant. Schmidt began selling beer in 1896, and in 1902 changed the name of his brewery to Olympia.

For decades, Olympia beer was brewed at the source with water obtained from artesian wells — natural aquifers with pressurized groundwater that Schmidt and many fans argued imparted unique and very desirable qualities in the beer. Schmidt chose the company's slogan, "It's the Water," when he renamed the brewery in 1902, because he believed the water to be of superior quality for brewing lagers. (Some beer fans remember a popular advertising campaign that claimed the water used in brewing Oly was under the jurisdiction of a group of imaginary and rambunctious creatures known as the "Artesians.")

Olympia survived Prohibition and began brewing again in 1934. It grew to become a popular regional brand in the Pacific Northwest. Oly, as it was always affectionately called, was sold by the Schmidt family in the 1980s to Pabst and changed ownership several times before being purchased by SABMiller. For a while under SABMiller's ownership, Olympia Brewing took over brewing other regional Northwest brands before the company shuttered the original Olympia brewery for good in 2003. Beer marketed under the Olympia name is now brewed at an SABMiller plant in California, and is still available in many states, but the Artesians — and their wells — are no longer involved.

Dixie: It's Sad but Pretty Like New Orleans

Local New Orleans band, The Iguanas, have a line in a song that could easily sum up the story behind Dixie Brewing Company — "It's sad but pretty like New Orleans."

Dixie, which opened in New Orleans in 1907, was once a staple in the South, and became an iconic symbol for the Crescent City. Huge iron gates still surround the six-story brewhouse, which was built for $85,000 by Valentine Merz, a saloon keeper who turned to the supplier side of the beer equation in the late 1800s.

At the time, Dixie was the youngest and most modern of many breweries among New Orleans' brewery district, with Falstaff's towering brewery — among others — being neighbors. Gleaming copper kettles and cypress-wood tanks were as beautiful as they were functional, and became the essence of Dixie Brewing as well as a shining example of the South's proud brewing traditions.

Dixie survived through Prohibition, manufacturing and distributing non-alcoholic beer until 1933. When Prohibition ended, Dixie Beer eventually became a national brand. Later, the beer wars that raged from the 1950s into the 1980s destroyed every other New Orleans brewery, but Dixie weathered every storm.

When Joe and Kendra Bruno bought the brewery as part of a real estate deal in 1985, Dixie was burdened with debt. It would have been easier to just drive old Dixie down, but something made them keep brewing. They declared Chapter 11 bankruptcy in 1989 and at the same time, chose to expand beyond American lager into some craft beer styles. Dixie's Blackened Voodoo Lager was born, and proved to be the magic that buoyed Dixie out of bankruptcy in 1992. But fate was not yet done with Dixie. In 2005, Hurricane Katrina proved to be Dixie's biggest nemesis. The venerable brewery stood strong against both the winds and the water that ravaged New Orleans when the Category 5 storm struck and, subsequently, the levees broke. But Dixie could not withstand the looters that came next. The beautiful old copper kettles were cut up and sold as scrap; copper wiring was stripped from the brewery and the old wooden tanks were also scavenged. Floodwater caused extensive damage to the building as well. To this day, the old brewery still stands bare and vacant in the wake of this disaster. The Brunos still say they hope to revive the old brewery.

In the meantime, Dixie is contract brewed and distributed far away from the South. But Dixie beer still stands strong as a symbol of Southern culture.

Choc: Beer Worth Going to Jail For

Choc Beer didn't start out as a brand; it started out as homebrew. "Choc" is an abbreviation of "Choctaw," for what many folks in eastern Oklahoma and western Arkansas once called "Choctaw Indian Beer" — a favorite in the region even before Oklahoma became a state of the union. In fact, before Oklahoma entered statehood, Choc's popularity spread like wildfire, prompting many fledgling brewers to concoct their own versions to suit his tastes. The prevalence of Choc beer in what was then Indian Territory was enough to warrant a report in 1894 to the U.S. Congress, which described Choctaw beer as a "compound of barley, hops, tobacco, fishberries (*Anamirta cocculus*, a preparation of which was often used as a stimulant in beer) and a small amount of alcohol." But at this time, Choc beer was brewed to please the brewer's personal tastes, so Choc could be brewed with additions of everything from peaches to rice to raisins.

Back then, it was a federal offense to even possess alcohol — much less sell it — in Indian Territory. And even when Oklahoma gained statehood in 1907, it entered the Union "dry," remaining that way until after Prohibition. Even during those dry decades, though, there were small restaurants — especially in southeastern Oklahoma — that secretly sold "Choc" to their favored, trusted customers. One of those restaurateurs was an Italian immigrant named Pietro Piegari, who changed his name to Pete Pritchard when he came to America as a young child. After a near-death experience working in a mine, Pritchard began to brew beer at home. He learned directly from some local Choctaws how to brew the mysterious Choc beer, which was very different in both flavor and appearance from the German lagers that Pritchard first learned to brew. Fellow immigrants began flocking to "Pete's place" to fill up on Pritchard's tasty, family-style Italian meals and wash it all down with his refreshing Choc beer. The Choc was all on the down-low, of course — even after Pritchard opened an official restaurant (Pete's Place) and continued serving his beer to a growing base of fans. Eventually, the law caught up with Pritchard, and he served two full terms in federal prison for bootlegging, with prison officials and politicians both refusing to give him parole because they had never had such a good cook in prison and were afraid the prisoners would revolt when he left. Today, Pritchard's descendents brew a legal version of the original Choc Beer (excluding fishberries and tobacco) along with several other styles, as this home brewery turned craft brewery's story continues.

Hamm's: From the Land of Sky-Blue Waters

Perhaps no other regional American lager brewery has as recognizable marketing as that of Hamm's from the days of old. From the Native-American drum beat of the beer's catchy jingle, ("From the Land of Sky Blue Waters … comes the beer refreshing. Hamm's the beer refreshing — Hamm's!") to the well-loved white-bellied black Hamm's beer bear, the Anheuser-Busch marketing might be the only rival for Hamm's clever advertising.

But neither marketing nor brewing was probably on the mind of the young German immigrant named Theodore

Hamm, who, along with his new bride, moved to St. Paul, Minnesota, in 1856. It wasn't long before a friend and brewer in town, Andrew Keller, approached Hamm for a loan to expand his Excelsior Brewery. Hamm loaned Keller the money, with the brewery as collateral. And when Keller defaulted on his loan, Hamm found himself the owner.

Under the keen business acumen of Hamm, the brewery, soon named after the owner, grew and expanded for several years, from 500 barrels in 1865 to 26,000 barrels in 1882. In 1896, the brewery incorporated, giving Theodore the title of president and his son, William, the titles of vice-president and secretary.

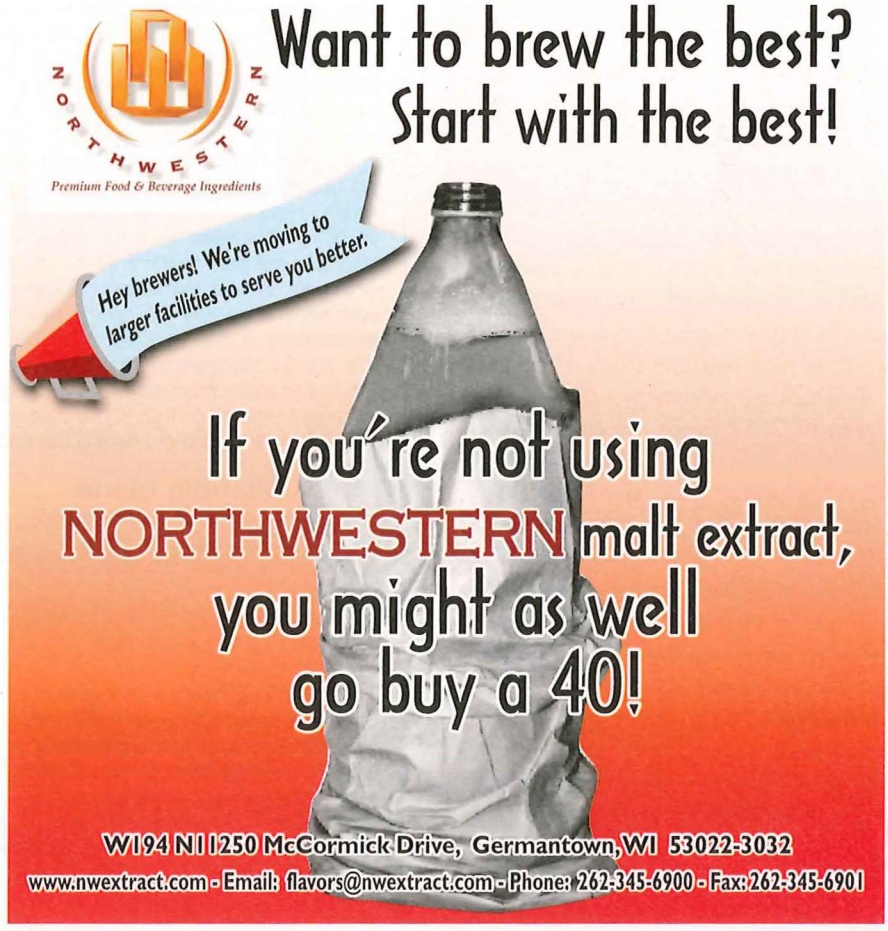
With that move, the Hamm's brewery stayed in the family for more than 100 years, weathering through Prohibition by making soft drinks and other beverages and through World War II when wives of employee's went to work at the brewery while their husbands were at war.

After expanding it from a regional brewery to a national brand, the Hamms family sold the brewery in 1964 for $65 million. The brewery then changed hands several times until Olympia Brewing Co. bought it in 1975. (Interestingly, the Hamm's brewery was originally built on artesian wells much like the Olympia brewery.) The Hamm's brewery was closed in 1997, and hasn't brewed a drop of Hamm's or any other beer ever since. Hamm's is currently brewed as a brand by MillerCoors.

Rolling Rock: From the Glass Lined Tanks of Old Latrobe

This East Coast offering is the youngest of all the beers featured in this article, having only been around since after Prohibition when it was launched by the Latrobe Brewing Company in 1939.





Although it was founded as a regional beer for western Pennsylvania (in the city of Latrobe, where the brewery was built in 1893), Rolling Rock's popularity spread relatively quickly — perhaps in part because of the distinctive green bottles and painted labels that have become the beer's trademark appearance. Another Rolling Rock distinction is its decidedly "creamed corn" flavor, which comes from using very lightly kilned malt.

One thing Rolling Rock lovers love to discuss is the reason for the number "33," which has always been printed prominently on the Rolling Rock bottles. The debate continues, despite some former Latrobe executives having said on record that the mysterious number appeared on the first bottles because a founder had written the number "33" after the pledge that was to appear on each bottle — all 33 words of it — to indicate to the printers how much space to plan for the pledge on the bottle. The printers, not realizing what the guy had done, included the number on the bottle.

That first pledge differed slightly from the current one, but both are 33 words long in keeping with the Rolling Rock tradition.

Original Rolling Rock Pledge: "A little nip from the glass lined tanks of Old Latrobe. We tender this package as a premium beer for your delight and economical use. It comes from the mountain springs to you."

Current Rolling Rock Pledge: "Rolling Rock, From the glass lined tanks of Old Latrobe we tender this premium beer for your enjoyment, as a tribute to your good taste. It comes from the mountain springs to you."

So, there you have it, Daddy-O — five grand old brews with five equally great histories, plus recipes so you can kick it old-school anytime you want!

Lisa Morrison writes about beer in her hometown of Portland, Oregon.

Retro Regional Beer Clones

Olympia clone
(5 gallons/19 L, extract with grain)

OG = 1.046 FG = 1.010
IBU = 14 SRM = 2.5 ABV = 4.7%

Olympia has a very clean flavor, a little malt flavor, a little corn flavor and a little rice flavor, with just a bit of citrus from American hops. There is debate whether the "new" version brewed in California is as good as the original version brewed in Olympia, WA.

Ingredients

3.0 lbs. (1.3 kg) light dried malt extract (such as Coopers or Briess)
2.0 lb. (0.91 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked rice
1 lb. 2 oz. (0.51 kg) corn sugar (5 mins)
2.5 AAU Cascade hop pellets (60 min) (0.50 oz./14 g of 5.0% alpha acid)
1.0 AAU Willamette hop pellets (5 min) (0.25 oz./7 g of 4.0% alpha acid)
½ teaspoon Irish moss (last 15 min)
White Labs WLP840 (American Lager) or Wyeast 2035 (American Lager) yeast
1.0 cup (200 g) corn sugar (for priming)

Step by Step

Steep the crushed grains in 1 gallon (3.8 L) of water at 150 °F (65 °C) for 45 minutes, stirring occasionally. Remove grains from the wort and rinse with 2 quarts (1.8 L) of 170 °F (77 °C) water. Add half the dried malt extract and water to make at least 3 gallons (11 L) of wort and boil for 60 minutes, adding the hops and Irish moss per the recipe schedule. For the last 5 minutes of the boil, add the remaining dried malt extract and corn sugar to dissolve it in to the wort. Cool the wort and transfer it to your fermenter, topping up with cold water to 5.0 gallons (19 L). Pitch your yeast when the beer has cooled to 68 °F (20 °C), and aerate. Hold the beer at around 68 °F (20 °C) until the yeast starts fermenting, and then cool the beer to 52 °F (11 °C) for the remainder of the fermentation. About 3 days after hitting your final gravity, raise the temperature of the beer to about 68 °F (20 °C) for 3 days for a diacetyl rest. Transfer to a secondary fermenter and lager the beer at about 35 °F (2 °C) for another 2 weeks before bottling or kegging this beer.

Olympia clone
(6 gallons/23 L, all-grain)

OG = 1.046 FG = 1.010
IBU = 14 SRM = 2.5 ABV = 4.7%

Ingredients

9.5 lb. (4.3 kg) 6-row pale malt
1.0 lb. (0.45 kg) rice
1.5 lb. (0.68 kg) brewers corn grits
3.0 AAU Cascade hop pellets (60 min) (0.60 oz./17 g of 5.0% alpha acid)
1.2 AAU Willamette hop pellets (5 min) (0.30 oz./8.5 g of 4.0% alpha acid)
½ teaspoon Irish moss (last 15 min)
White Labs WLP840 (American Lager) or Wyeast 2035 (American Lager) yeast

Step by Step

This beer is brewed with a double mash and is diluted upon packaging as all American-style Pilsners are. You ferment 5 gallons (19 L) of base beer, but yield 6 gallons (23 L) in the keg.

Reserve a handful of 6-row malt. Mash in remaining malt with 4.1 gallons (16 L) of water at 133 °F (56 °C) and begin mashing at 122 °F (50 °C) in your kettle. Combine rice and corn with the handful of 6-row malt in 1.0 gallon (3.8 L) of water in a large kitchen pot and begin heating it. Rest cereal mash at 158 °F (70 °C) for 5 minutes, then bring to a boil. Boil for 30 minutes, stirring almost constantly. Heat the main mash, stirring often, to 140 °F (60 °C) and hold. Combine cooked corn and rice with main mash and adjust temperature — if needed — to 152 °F (67 °C). Hold at 152 °F (67 °C) for 30 minutes, stirring often. Heat mash to 168 °F (76 °C), stirring often, and transfer mash to lauter tun, recirculate and run off wort. Sparge with water hot enough to keep grain bed at 170 °F (77 °C). Collect about 5.0 gallons (19 L) of wort, add 1.5 gallons (5.7 L) of water and bring the wort to a vigorous, rolling boil.

Boil the wort down to 5.0 gallons (19 L) over 90 minutes, adding hops and Irish moss at times indicated. Cool wort down to 48 °F (8.8 °C) and transfer wort to fermenter. Aerate wort and pitch yeast from starter.

Ferment beer at 52 °F (11 °C), allowing temperature to rise to 60 °F (16 °C) when fermentation is almost finished. Hold for 3 days at this temperature. Separate beer from yeast and cool to 40 °F (4.4 °C). Allow to cold condition (lager) for 4–5 weeks. When you are ready to keg the beer, boil a little over 1.0 gallon (3.8 L) of water for 15 minutes, cool rapidly and add 3.3 qts. (3.2 L) to your 5-gallon (19-L) Corny keg. Transfer beer to keg until it is full. You will be left with 3.3 qts. (3.2 L) of base beer to either dilute to 4 qts. (3.7 L) with boiled and cooled water or to package as "malt liquor."

Dixie clone
(5 gallons/19 L, extract with grain)

OG = 1.046 FG = 1.011
IBU = 17 SRM = 2.5 ABV = 4.5%

Dixie is an American Pilsner style beer, with adjunct levels a bit lower than most of "Grandpa's beers." This extra maltiness gives a bit more robust flavor to it, and a slightly darker color. Its yeast flavor leans more toward the Pilsner style, but uses American hops so that their characteristic citrus flavor comes through.

Ingredients

2.5 lbs. (1.1 kg) light dried malt extract (such as Briess Golden Light)
3.0 lb. (1.4 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked rice
1.0 lb. (0.45 kg) flaked corn
3.75 AAU Cascade hop pellets (60 min) (0.75 oz./21 g of 5.0% alpha acid)

2.0 AAU Willamette hop pellets (0 min) (0.5 oz./14 g of 4.0% alpha acid)
½ teaspoon Irish moss (last 15 min)
White Labs WLP838 (Southern German Lager) or Wyeast 2124 (Bohemian Lager) yeast
0.75 cup (150 g) corn sugar for priming

Step by Step

Steep the crushed grains in 2 gallons (7.6 L) of water at 150° F (65 °C) for 60 minutes, stirring often. Rinse with 2 quarts (1.8 L) of 170 °F (77 °C) water. Add half the dried malt extract and water to make at least 3 gallons (11 L) and boil wort for 60 minutes, add the hops and Irish moss per the recipe schedule. For the last 5 minutes of the boil, add the remaining dried malt extract. Cool wort, transfer to fermenter and top up to 5.0 gallons (19 L). Pitch your yeast when the beer has cooled to 68 °F (20 °C), and aerate. Hold the beer at around 68 °F (20 °C) until the yeast starts fermenting, and then cool the beer to 52 °F (11 °C) for the remainder of the fermentation. About 3 days after hitting your final gravity, raise the temperature of the beer to about 68 °F (20 °C) for 3 days for a diacetyl rest. Transfer to secondary and lager the beer at about 35 °F (2 °C) for another 3 weeks before bottling or kegging this beer.

Dixie clone

(5 gallons/19 L, all-grain)

OG = 1.046 FG = 1.011
IBU = 17 SRM = 2.5 ABV = 4.5%

Ingredients

8.0 lbs. (3.6 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked rice
1.0 lb. (0.45 kg) flaked corn
3.75 AAU Cascade hop pellets (60 min) (0.75 oz./21 g of 5.0% alpha acid)
2.0 AAU Willamette hop pellets (0 min) (0.50 oz./14 g of 4.0% alpha acid)
½ teaspoon Irish moss (last 15 min)
White Labs WLP838 (Southern German Lager) or Wyeast 2124 (Bohemian Lager) yeast

Step by Step

This is a simplified recipe using flaked adjuncts and a single infusion mash. Mash at 153 °F (67 °C) for 60 minutes. Mash out to 167 °F (75 °C) and collect approximately 7 gallons (26 L) of wort. Boil the wort for 30 minutes without hops, and then add your hops according to the extract recipe schedule above. Fermentation is the same as well.

Choc clone

(5 gallons/19 L, extract with grain)

OG = 1.041 FG = 1.009
IBU = 9 SRM = 2.5 ABV = 4.1%

This beer has had many different variants. This clone recipe is close to the current version, which is a cloudy, unfiltered wheat/barley beer with some funky ale flavors, 4.0% alcohol, lots of fruitiness from a warm fermented Hefeweizen yeast. Choc is bottle





conditioned, and not filtered prior to bottling, so it can have large amounts of sedimentation at the bottom of the bottle. There is also a bit of lemony flavor to Choc, typical of a wheat beer.

Ingredients

3.5 lbs. (1.6 kg) Briess Weizen dried malt extract
0.50 lb. (0.23 kg) 2-row pale malt
0.50 lb. (0.23 kg) white wheat malt
0.50 lb. (0.23 kg) CaraPils® malt
0.50 lb. (0.23 kg) torrified wheat
1.3 AAU Cascade hop pellets (60 min) (0.25 oz./7 g of 5.0% alpha acid)
1.3 AAU Cascade hop pellets (15 min) (0.25 oz./7 g of 5.0% alpha acid)
1.0 AAU Liberty hop pellets (5 min) (0.25 oz./7 g of 4.0% alpha acid)
White Labs WLP320 (American Hefeweizen) yeast
0.75 cups (150 g) corn sugar (for priming)

Step by Step

Steep the crushed grains in 2.8 qts. (2.6 L) of water at 150 °F (65 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add half the dried malt extract and water to make at least 3 gallons (11 L). Boil wort for 60 minutes, adding the hops per the recipe schedule. For the last 5 minutes of the boil, add the remaining dried malt extract. Cool wort, transfer to fermenter and top up with cold water to 5.0 gallons (19 L). Pitch your yeast when the beer has cooled to 68 °F (20 °C), and aerate. Choc is served cloudy, so don't worry about racking to a secondary fermenter. Bottle with ¾ cup of corn sugar about 3 days after you hit your final gravity. Let it bottle condition for one week. This is homebrew, proudly serve this beer in a mason jar after rolling the bottle on the table to mix the yeast back into suspension!

All-grain option:

This is a single step infusion mash using 4.5 lbs. (2.0 kg) of pale 2-row malt, 3.5 lbs. (1.6 kg) of white wheat malt, 0.5 lb. (0.22 kg) of CaraPils® malt and 0.5 lb. (0.22 kg) of torrified wheat. Mash at 154 °F (68 °C). Boil for 90 minutes. Fermentation is the same as in the extract recipe.

Hamm's clone

(5 gallons/19 L, extract with grain)

OG = 1.040 FG = 1.006
IBU = 20 SRM = 3.2 ABV = 4.5%

Hamm's is crisp, refreshing and very light in color and body. It typically has very high carbonation levels that cover any sweetness that might be present although there are reports of draft Hamm's having a lower carbonation level. Its hop level is around 20 IBUs, with a slightly lemony flavor.

Ingredients

3.3 lbs. (1.5 kg) light malt extract syrup (such as Coopers)
2.0 lb. (0.91 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked corn
0.75 lbs. corn sugar (last 5 minutes of boil)
2 AAU Hallertau hop pellets (60 min) (0.5 oz./14 g of 4.0% alpha acid)
2.25 AAU Tettnanger hop pellets (60 min) (0.5 oz./14 g of 4.5% alpha acid)
2 AAU Hallertau hop pellets (5 min) (0.5 oz./14 g of 4.0% alpha acid)
½ teaspoon Irish moss (last 15 mins)
White Labs WLP840 (American Lager) or Wyeast 2035 (American Lager) yeast
1 cup (200 g) corn sugar for priming

Step by Step

Follow the basic instructions for the Olympia extract clone (on page 38).

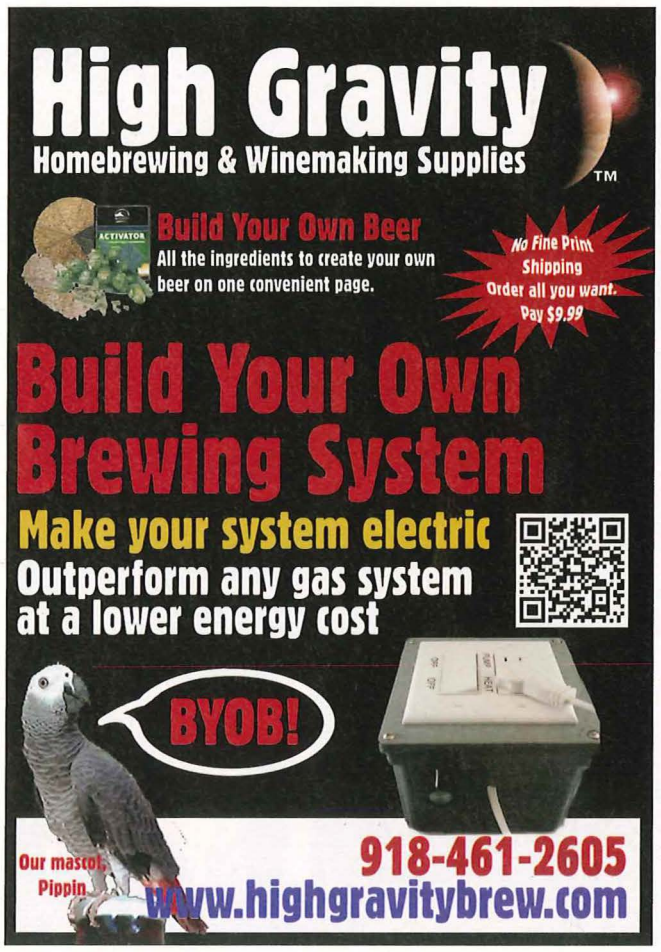
Hamm's clone

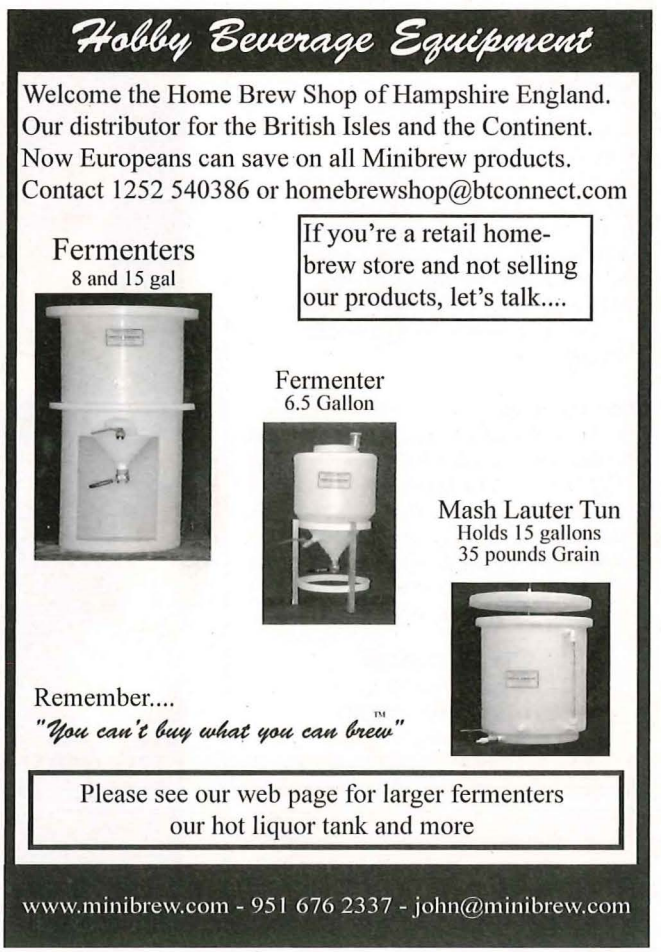
(6 gallons/23 L, all-grain)

OG = 1.040 FG = 1.006
IBU = 20 SRM = 3.2 ABV = 4.5%

Ingredients

7.8 lbs. (3.5 kg) 6-row pale malt
3.0 lbs. (1.4 kg) brewers corn grits
2.4 AAU Hallertau hops (60 min) (0.6 oz./17 g of 4.0% alpha acid)
2.7 AAU Tettnanger hops (60 min) (0.6 oz./17 g of 4.5% alpha acid)





2.4 AAU Hallertau hops (5 min)
(0.6 oz./17 g of 4.0% alpha acid)
½ teaspoon Irish moss (15 mins)
White Labs WLP840 (American Lager) or
Wyeast 2035 (American Lager) yeast

Step by Step
Follow the basic instructions for the Olympia all-grain clone (on page 38).

Rolling Rock clone
(5 gallons/19 L, extract with grain)

OG = 1.041 FG = 1.006
IBU = 21 SRM = 2.1 ABV = 4.5%

Rolling Rock Extra Pale is the United States leader in a beer using an "off-flavor" to differentiate itself from all of the other American Pale lagers. Rolling Rock has made a name for itself by brewing a pale lager with a significant amount of DMS (Dimethyl Sulfide) in its flavor profile. The best way for a homebrewer to get this flavor in your beer, is to boil your beer with the lid of your pot covering as much of the kettle as possible without boiling over.

Ingredients
2 lb. 10 oz. (1.2 kg) light dried malt extract (such as Coopers)
0.50 lbs. (0.23 kg) rice syrup solids
2.0 lb. (0.91 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked corn
5.6 AAU Willamette hops (60 min)
(0.5 oz./14 g of 5.0% alpha acid)
2.25 AAU Tettnanger hops (60 min)
(0.5 oz./14 g of 4.5% alpha acid)
½ teaspoon Irish moss (15 min)
White Labs WLP840 (American Lager) or
Wyeast 2035 (American Lager) yeast
0.75 cup (150 g) corn sugar (for priming)

Step by Step
Follow the basic instructions for the Olympia extract clone (on page 38).

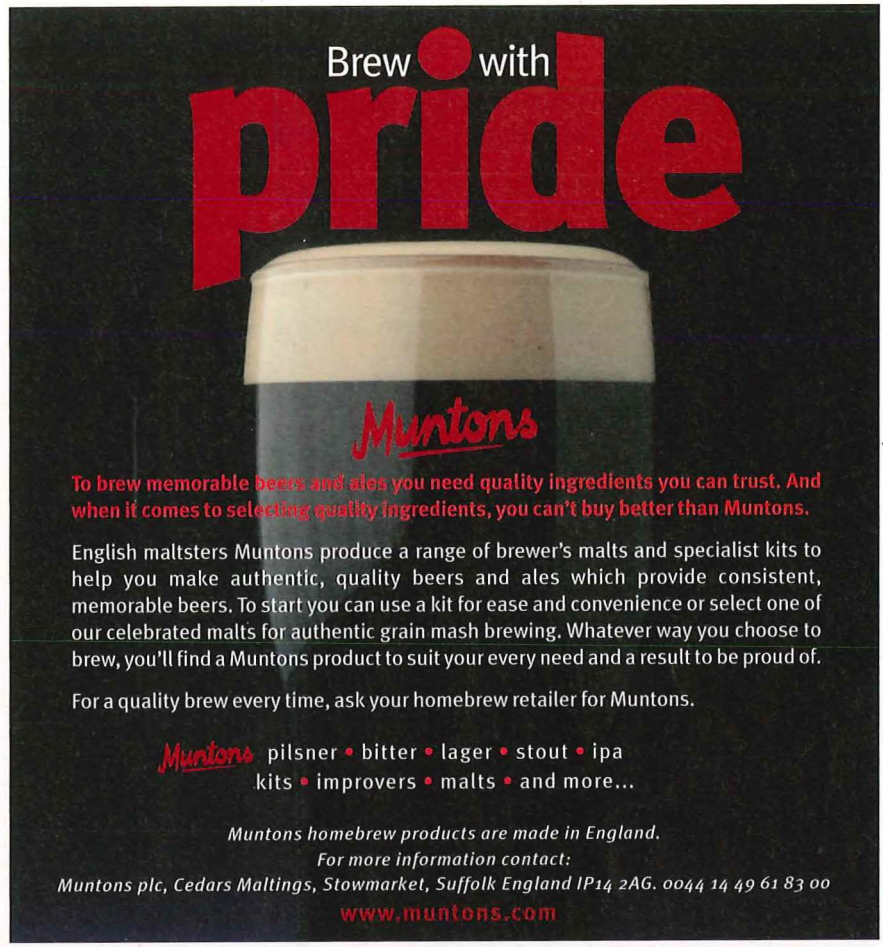
Rolling Rock clone
(5 gallons/19 L, all-grain)

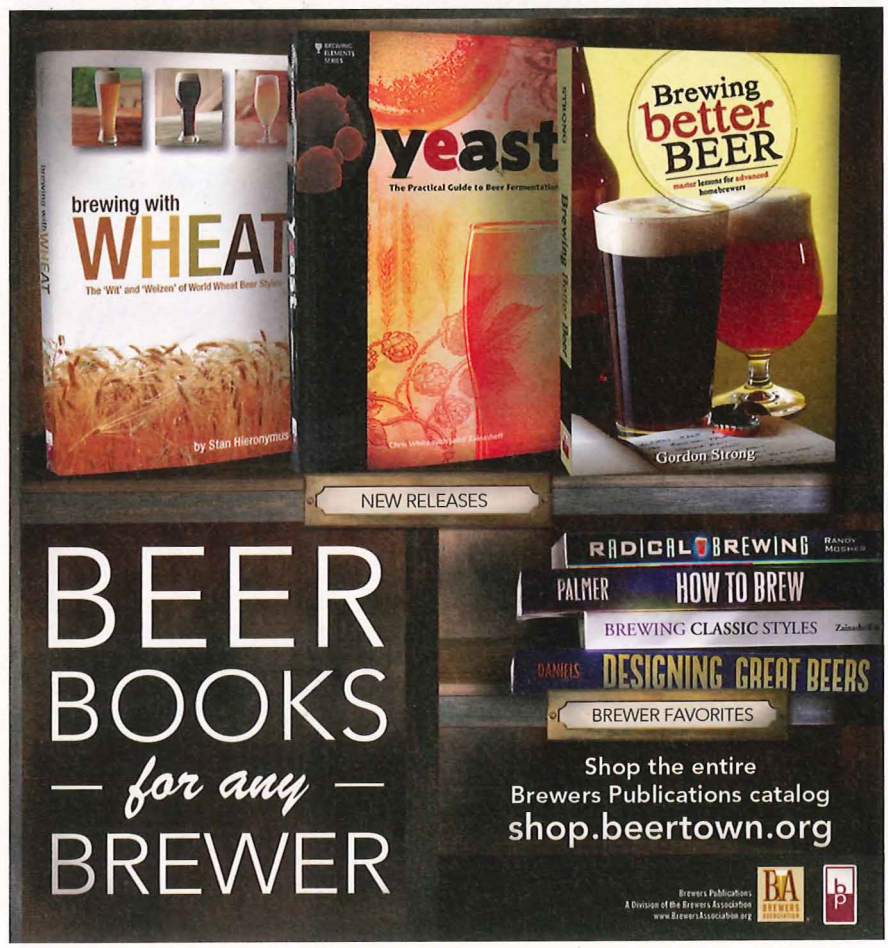
OG = 1.041 FG = 1.006
IBU = 21 SRM = 2.1 ABV = 4.5%

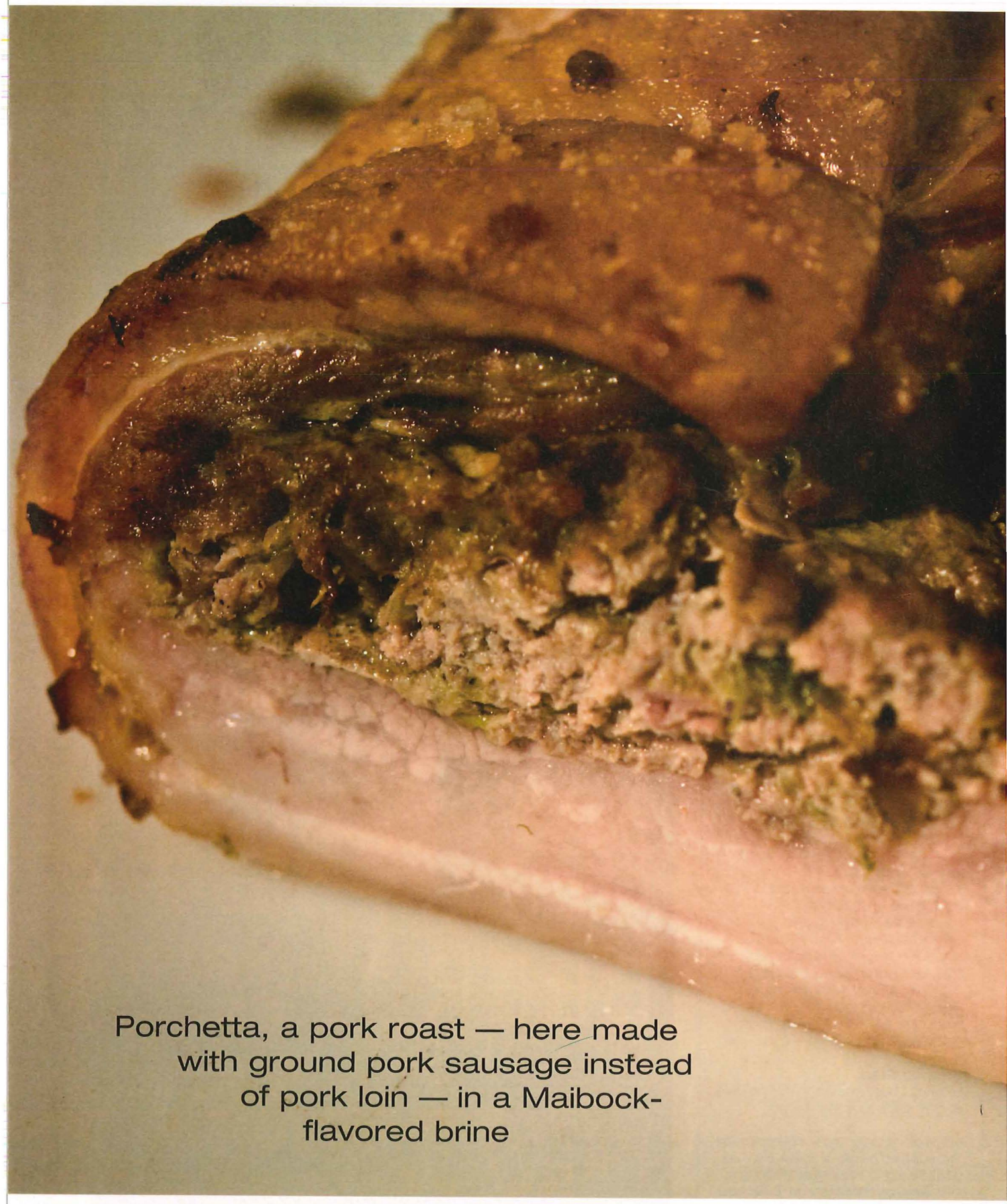
Ingredients
6.5 lbs. (3.0 kg) 6-row pale malt
1.0 lb. (0.45 kg) flaked rice
1.5 lbs. (0.68 kg) flaked corn
5.6 AAU Willamette hops (60 min)
(0.5 oz./14 g of 5.0% alpha acid)
2.25 AAU Tettnanger hops (60 min)
(0.5 oz./14 g of 4.5% alpha acid)
½ teaspoon Irish moss (15 min)
White Labs WLP840 (American Lager) or
Wyeast 2035 (American Lager) yeast

Step by Step
Follow the basic instructions for the Dixie all-grain clone (on page 39). BYO

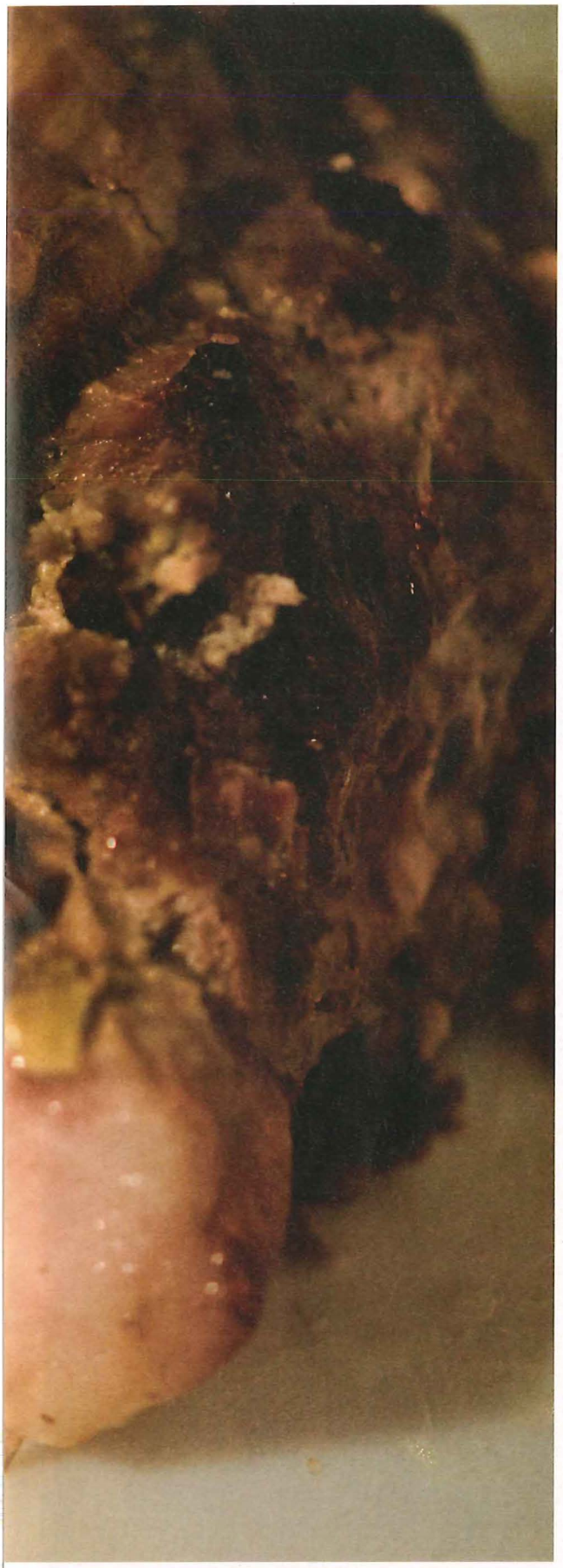
All clone recipes were developed by Steve Bader, owner of Bader Beer and Wine Supply in Vancouver, Washington, and frequent contributor to Brew Your Own *magazine.*







Porchetta, a pork roast — here made with ground pork sausage instead of pork loin — in a Maibock-flavored brine



Cooking with Bock

Even though traditionally this beer is served in May, a Maibock or Helles Bock is one of those brews that satisfies the palate and can (and should) be a year around addition to any kegerator or beer fridge.

This lager style is smooth, free of any esters or phenols, creating a clean and unobstructed taste of the malt and hops.

The grain bill for a Maibock consists of lightly kilned malts. Continental Pilsner malt, Vienna malt, Munich malt, and sometimes a hint of light caramel malt, construct a rich mouthfeel, full of honey undertones. Touches of melanoidins combine with a European delicateness that showcases its sophistication by its design.

Traditional noble hops spice the brew, with Hallertau and Tettnang being popular choices. A Maibock generally shows a bit more hop character than other beers in the bock family.

The lager yeast strain enriches the malt complexity further with good attenuation. Popular choices for fermenting a Maibock include Wyeast 2206 (Bavarian Lager), Wyeast 2308 (Munich Lager), White Labs WLP838 (Southern German Lager) and White Labs WLP920 (Old Bavarian Lager). A high degree of attenuation enhances the lavish grain properties, making a refined finish, free of any notes of cloying sweetness, yet still reminding the taster that beer is in the bock family. To get the proper attenuation and a clean lager taste, you must pitch an adequate amount of healthy yeast to your wort. Hold the temperature as constant as possible through

Story and photos by **Sean Paxton**



Above: Leeks and other vegetables are chopped and sautéed and worked into the "meatloaf" at the center of the porchetta.

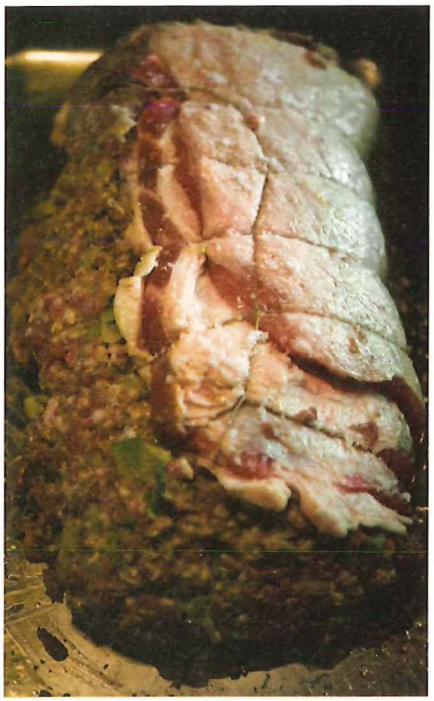
At right: The pork sausage and vegetables in the "meatloaf" are held together with a mixture of bread crumbs soaked in eggs. The "meatloaf" is wrapped in a pork belly and oven roasted in a pan, so the pan drippings can be collected to make gravy. This makes a hearty meal that pairs well with a hearty bock beer.

most of primary fermentation, then let it rise near the end to let the yeast clean up any residual diacetyl. Then, lager the beer at near freezing for at least a month. (For complete instructions on brewing Maibock or helles bock, see the "Style Profile" column on page 19 of this issue.)

This malt impression found in this style of beer is perfect for a food application. Whether it be a sweet pork chop or roast, a succulent chicken or fowl or a nutritious filet of Alaskan Copper River salmon or cold water halibut, the lager will impart an additional band of depth and character to each bite. This German beer can easily travel across international borders and would be a brilliant addition to a Thai dish, balancing out the chili heat and robust nuances with its honey undertones or replacing a Japanese style saké as a steaming or poaching medium for fish or seafood. Indian vegetable curries incorporate a complex array of spices, the malt base would complement the onion and garlic foundation that the cuisine style builds its flavor profile from.

As the beer is a neutral canvas, the alcohol present (around 6.3–7.4% ABV) helps amplify the savory and sweetness of other food ingredients. Even in the Germanic cuisine, something as simple as the beloved spätzle could be modernized. Try substituting half of the all purpose flour with a pretzel flour (pretzels that have been pulsed in a food processor until a fine





Above: The pork sausage "meatloaf," wrapped in a pork belly and held together with butcher's twine.

This porchetta is initally cooked at a low temperature (325 °F/160 °C), before the temperature is raised to 425 °F/220 °C) to brown the exterior.

Below: Seasonings cling to the skin of the pork belly. The dish is served with Maibock beer gravy.



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Traditional porchetta is made from a pork loin. In this beer-inspired recipe, a "meatloaf" made from ground pork sausage takes its place. The malty, grainy flavor of Maibock is infused into the meat during the brining process and more Maibock is used in making the gravy. The spicy character from the hops blends harmoniously with the seasonings of the meat.

powder is created) and using a helles bock instead of milk. This will transform the noodlish-like dumplings into a pretzel spätzle. This would pair perfectly with a bockwurst simmered in a Maibock and a few slices of onion, served with a spicy German bière mustard mixed with a touch of honey and a splash of the lager to make a sauce.

To add to the intrigue of this unique malt backbone, the delicate hop flavor reminds the palate that it's not just about bitterness but a balance of bitterness to sweetness, along with herbs and peppery flavors. The classic noble hop additions to the boil of a Hallertauer Mittelfrüh and Hersbrucker call for a larger amount of hops to be used, increasing the hops characteristic to the palate due to the low alpha acids in these varieties. This gives the style lots of floral, herbal, peppery, earthy and grassy nuances which can further enrich a dish or recipe. When herbs are added to a cooking creation, the elements of each herb's flavor enhance the flavor of the protein in the dish as opposed to disguising or distorting it. However, herbs as additions to develop flavor should be used in moderation. The





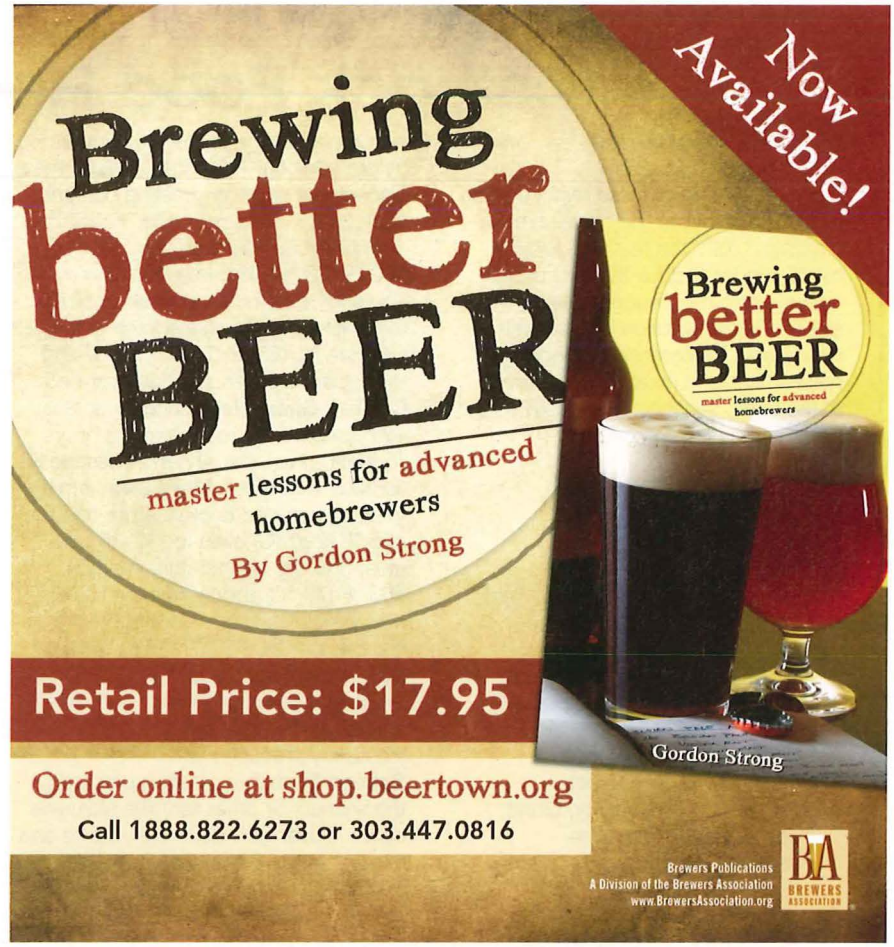


The finishing porchetta can be served with Maibock beer gravy. This gravy is made from pan drippings from the roasted porchetta, flour and Maibock (or other pale bock beer). A roux is made from the fat from the pan drippings and flour. Once browned, the beer and liquid part of pan drippings are stirred in to make a pan gravy.

Hallertauer hops are used in a similar manner in the beer's flavor profile as well. Think about using those flavor attributes and how they can boost the notes of thyme, bay leaf, marjoram, oregano, sage, basil, chives, parsley and/or tarragon in a recipe. Try adding some freshly chopped herbs to an appetizer, salad, soup or entrée and how the pairing of this style could be enforced and create the bridge of balance in the dish and in the glass. As a homebrewer, think about enhancing the hop flavor of this brew with these herbs, in the brewing process. Try adding some fresh thyme, bay leaves and/or marjoram to the whirlpool, preserving the herb's essential oils to give a fresh twist to the style and boost the boundaries of the hop essense.

The recipes starting on the next page are hearty, bold and flavorful. The meats and grains infused with the blond bock style, enhance the natural sweetness found at both the beer and the food's core.

Sean Paxton, "The Homebrew Chef," is a frequent contributor to BYO.



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Maibock Food Recipes

Maibock Beer Brine

(1.0 gallon/3.8 L of brine)

While the brining process might add an extra day or two to the overall time in creating a dish, the resulting juicy, moist, tender and full-flavored protein will be worth this important step. The salt and sugar solution infused with beer works via osmosis; replacing the natural liquids in meat with the flavors of the brine, seasoning the meat on the inside, not just the outside.

Ingredients

32 fluid oz. (950 mL) water
1 cup salt, kosher
¼ cup honey, wild flower
¼ cup dried malt extract (DME), light
4 each garlic cloves, peeled and lightly smashed
2 each bay leaves, preferably fresh
1 each onion, yellow, large, peeled and sliced
½ bunch thyme, fresh
48 fluid oz. (1.4 L) ice cubes
48 fluid oz. (1.4 L) Maibock, blond bock or helles bock style homebrew, cold

Step by Step

In a large pot, add the water, salt, honey, DME, garlic, bay leaves, onion and thyme. Place over high heat and bring the mixture to a boil. Let the brine cook for 10 minutes, allowing time for the sugar and salt to dissolve. Turn off the heat and add the ice, stirring to cool the brine mixture. Once cool, add the cold lager and mix well. The brine is ready to use when the temperature is below 40 °F (4.4 °C).

To use the brine, place the protein (meat) into a large container or sealable gallon-sized (4-L) bag. Pour enough brine to cover the protein, sealing the container and refrigerate. (Important note: do not reuse a brine.)

How To Use The Brine:

Pork Belly: For a 6-pound (2.7-kg) piece, cover the pork belly with the chilled brine. Rotate every 8 hours for 24–36 hours, as this cut of meat is relatively thin.

Pork Shoulder/Butt: Add a bone-in pork shoulder/butt to a large container and cover with the brine and let soak for 36-48 hours. Drain the brine and pat the pork dry. Place the shoulder/butt in to a roasting pan a cook at 250 °F (120 °C) for 8 hours. Let cool for 20–30 minutes, then either slice or pull apart.

Whole Chicken: For a 4–5 pound (1.8–2.3 kg) chicken, brine for 24–36 hours. Drain off the brine, pat dry and let the chicken air dry for 45 minutes before cooking. Truss the chicken, then place it in a sauté or roasting pan and cook for 45 minutes at 475 °F (250 °C) or until a meat thermometer reaches 160 °F (70 °C). Remove from the oven. The carry over heat will finish cooking the chicken, bringing the internal temperature to 165 °F (74 °C), producing the juiciest chicken one has ever had.

Cornish Game Hen: Brine for at least 12 hours, but no more than 18 hours. To roast, drain, pat dry and truss the little birds with twine. Place them into a roasting pan and cook in a pre-heated 425 °F (220 °C) oven for 30–35 minutes, until the temperature reaches 160 °F (70 °C) and let rest for 10 minutes before serving. Also try deep frying them in 340 °F (170 °C) oil until an internal temperature of 160 °F (70 °C) is reached. (Read up on how to deep fry chickens, being careful and following all the safety precautions.)

Salmon Filet: In a roasting pan, add the salmon (or other fish) filet skin side down. Cover with the brine mixture and refrigerate for 4–6 hours. Remove the fish from the brine, dry well. This fish can be grilled, roasted or sautéed.

Porchetta with a Maibock Beer Gravy

(Serves 8-10 guests, with leftovers)

Porchetta is a pork roast, but made even better. Traditionally a pork loin roast is wrapped with a pork belly, sometimes layered with seasonings, then tied together and roasted until the belly is crispy and the inside tender and juicy. This recipe replaces the pork roast with coarse ground pork sausage, creating a filling similar to a pork "meatloaf." This is a great dish for a Sunday supper, and will feed many souls.

Porchetta Ingredients

6 pound (2.7 kg) pork belly, skin on or off (may be special ordered from your butcher)
1 recipe Maibock Beer Brine
3 tablespoons olive oil
2 each leeks, white and light green part only, washed well, sliced (about 4 cups)
2 each bay leaves, preferably fresh
1 each fennel (sometimes called anise), stalks removed, cored and chopped
1 each onion, yellow, large, peeled and chopped
2 tablespoons thyme, fresh, minced
2 each eggs, jumbo
8 fluid oz. (240 mL) Maibock, helles or blond bock homebrew
6 each garlic cloves, peeled
2 tablespoons salt, kosher
1 teaspoon black pepper, freshly cracked
2 slices bread, crust on, lightly stale
1 cup panko or other bread crumbs
3 pound (1.4 kg) pork shoulder, ground on a coarse die
10 each sage leaves, fresh
1 each roasting pan
butcher/kitchen twine

Maibock Beer Gravy Ingredients

pan drippings from porchetta
2 shallots, peeled and minced
¼ cup flour, all purpose
12 oz. (355 mL) Maibock or helles bock
1 tsp. thyme leaves, fresh
1 tsp. sage leaves, minced

Step by Step (Porchetta)

Make the Maibock Beer Brine and place the pork belly in the brine, following the brine directions for pork belly.

Remove the pork belly from the brine and pat it dry. Lay it flat onto a cutting board, with the fat side down, meat side up. Let it sit and warm to room temperature as the filling is being prepared. In a large sauté pan or Dutch oven, placed over medium heat, add the oil and sauté the leeks, bay leaves, fennel and onions, seasoning lightly with some kosher salt. After about 5 minutes of cooking, add the thyme and continue stirring occasionally until the leeks are wilted, the fennel is lightly caramelized and the onions are soft and light golden in color. Remove the pan from the heat and let cool to room temperature.

In the pitcher of a blender, add the eggs, lager beer, garlic, salt, pepper and blend until the mixture is smooth and ingredients combined. Next, add the bread slices to a bowl of a food processor and pulse several times to make fresh bread crumbs. Add the panko or unseasoned bread crumbs to the fresh bread crumbs and pulse a few times to mix the two together. Pour the bread crumb mixture into a bowl and add the egg/beer mixture, and combine with a spatula. Let this mixture sit (basically making a panade or binder that will hold the ground pork together and act as a seasoning agent), allowing the bread crumbs to absorb the beer/egg mixture, for about 5 minutes. Stir in the cooled leek/fennel/onion mixture to the panade. Add the ground pork to the bowl and mix all the ingredients together until evenly distributed. This mixture will look similar to a meatloaf and could

be used as such.

Take the pork belly and place the longest size parallel to the work surface. Lightly season the meat with salt and pepper, then arrange the sage leaves across one side of the belly. Add the pork mixture to the center of the rectangle of meat, forming a log shape. Fold the farthest edge of the pork belly over the log of pork mixture, until it touches the other side of the belly. Using butcher's/kitchen twine, tie the roast every 3 inches (8 cm) around the outside of the pork belly, to hold the "roast" together. Transfer the porchetta roast to a roasting pan, pressing any of the pork mixture that may have tried to escape back into the roast.

Place the porchetta into a preheated 325 °F (160 °C) oven for about 3 hours, until the internal temperature reaches 150 °F (66 °C). Increase the heat to 425 °F (220 °C) and cook the roast until the outside turns a wonderful rich golden hue, while bringing the temperature of the roast to 165 °F (74 °C), about 20–30 minutes. Remove the roasting pan from the oven and set on a heat-proof rack, carefully pouring off any pan drippings into a liquid measuring cup. Then cover the roast with aluminum foil, to rest for 30 minutes before serving.

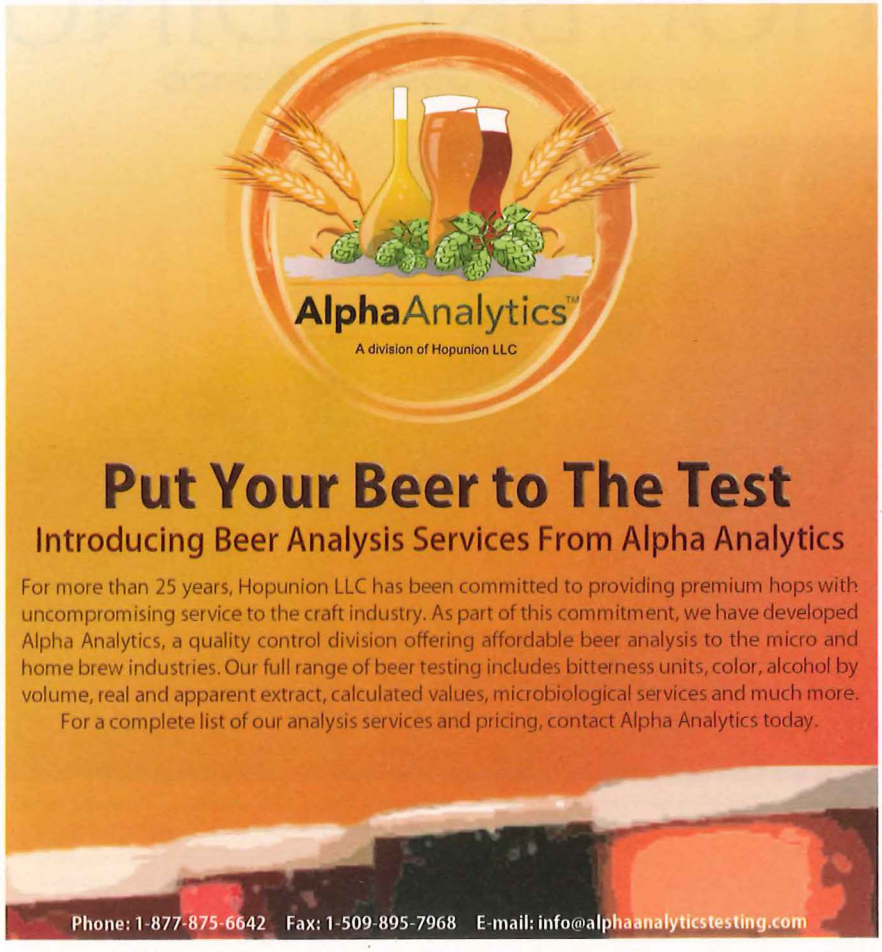
Step by Step (Maibock Beer Gravy)

Take the pan drippings and let sit, allowing the fat to float to the top. Measure out 5 tablespoons of the fat and add that to a sauce pan. Place the pan over medium heat and add the shallots, cooking for about 2 minutes. Mix in the flour, using a whisk to make a paste. Cook the roux for about 4 minutes, turning the mixture a light golden brown color. Add the remaining pan drippings, along with the remaining Maibock and bring to a boil. Simmer the gravy for around 8–10 minutes, until it is slightly thick and the flour taste has cooked out of it. Season the sauce with thyme, sage and taste to see if the gravy needs any salt and pepper. Let the gravy cook for 1–2 minutes, checking the consistency. If the gravy becomes too thick, add a touch more beer. Remove from the heat and place into a gravy boat.

To Serve:

Place the cooked porchetta onto a serving platter and remove the twine. Carve the roast into medium thick slices and serve with the Maibock Beer Gravy over the top. A good warmed sauerkraut or sautéed green cabbage would bring out the inner Bavarian in anyone. BYO









Aroma

HOP BREEDING

Story and photos by **Joseph Alonzo**



The road to creating a new hop variety is long. Hop breeders select promising male and female hop plants and mate them. Seeds are collected and grown in test blocks. Cones from the many individual offspring plants are harvested and screened for positive brewing characteristics. If a plant is deemed promising, it is propagated by rhizome and tested for its agronomic properties (pest resistance, drought resistance, yield, etc.) The vast majority of plants are weeded out early in the screening process.

IMAGINE POPPING OPEN A COOL BOTTLE OF IMPERIAL IPA AND BEING SWEPT AWAY BY A WAVE OF FRESH, CHOCOLATY HOPS. YES, YOU READ THAT RIGHT, CHOCOLATY HOPS. WELL, OVER AT OREGON STATE UNIVERSITY, THE AROMA HOP BREEDING PROGRAM IS STUDYING ALL OF THE VARIOUS HOP TASTES AND SMELLS AND NEW HOPS ARE CONSTANTLY BEING BRED. IF THINGS GO ACCORDING TO PLAN, THE CRAFT AND HOMEBREWER WILL HAVE A VARIETY OF STRANGE AND UNIQUE HOPS TO EXPERIMENT WITH IN THE COMING YEARS.

FOR DECADES CRAFT AND HOMEBREWERS SELECTED FROM A WIDE RANGE OF HOPS. RECOGNIZABLE HOPS, SUCH AS THE EUROPEAN VARIETIES HALLERTAUER AND SAAZ, AND AMERICAN FAVORITES LIKE CASCADE AND COLUMBUS HAVE LONG BEEN AVAILABLE AND ARE STAPLES IN MANY BEER RECIPES. HOWEVER, FEW GENUINELY "NEW" HOPS HAVE COME TO MARKET IN DECADES. IN FACT, MANY OF THE HOP CULTIVARS CREATED OVER THE LAST FEW DECADES WERE INTENDED TO REPLICATE EXISTING TRADITIONAL HOPS, WITH EXCEPTIONS SUCH AS SIMCOE® AND AMARILLO®. ALL OF THAT MAY BE ABOUT TO CHANGE, THANKS TO SOME CREATIVE RISK TAKERS OUT IN OREGON.

Indie Hops

In the fall of 2008, two long time friends, Jim Solberg and Roger Worthington, were discussing the state of hops over a craft brew at Hopworks Urban Brewing in Portland, Oregon when an idea hit them — why not start a hops supplier focused on craft brewers and a program to create new hops designed for craft brewers? They were not alone, many new hop companies sprung up after the 2008 hop crisis.

Recalls Solberg, "Industrial brewers were gradually going away from the aroma hop and more and more interested in the higher alpha acid varieties." This shift left craft brewers with fewer aroma hops to experiment with at a time when craft brewing was booming. "The industry's gotten so big on the craft side of things, it truly needs a hop supply that is focused toward it" says Solberg.

One decision was easy: it needed to be located in the Willamette Valley, Oregon. "The Willamette Valley has a special thing here with respect to a lot of the aroma hop varieties in terms of the quality they can coax out of those hops, a lot of them were bred right here in Corvallis," explains Solberg. This is true of the soil, but also of the culture. Solberg explains "The Willamette Valley was custom made for the craft industry. The Willamette Valley has really been moving much more toward artisan agriculture. The diversity of crops in the Willamette Valley is incredible. There are some three hundred crops being grown here."

Stepping out into the great beyond, Solberg and Worthington started Indie Hops, named in dedication to their commitment to being an independent alternative.

Aroma Hop Breeding Program

As for the hop geneticists, there were some right down the road at Oregon State University. OSU has hosted a US Department of Agriculture hop breeding program since the 1930s, but not one specifically targeted at aroma hops or the craft brewer.

Both Solberg and Worthington had histories at Oregon State and knew it would be the right fit.





Plant geneticist Dr. Shaun Townsend examines a vine in one of the hop yards at an Oregon State Universitiy research farm in the Willamette Valley. As hops take at least two years to become fruitful, growing and screening for plants with desirable attributes is time consuming. New varieties must be screened both for brewing attributes and growing characteristics.

After a few meetings, Indie Hops knew that their excitement was shared by those at OSU. Early in 2010, Indie Hops donated over a million dollars to OSU to create the Aroma Hop Breeding Program. These funds launched a brand new program, to develop new hop cultivars, adapted for Willamette Valley, Oregon growing conditions, with a focus on essential oil quantity and quality and all of it targeted specifically to the craft brewer.

Indie Hops' excitement was shared by many people at the university, in particular hop geneticist, Dr. Shaun Townsend — who would head the program — and Dr. Thomas Shellhamer, associate professor in food science and technology.

Townsend is a hop breeding specialist and professor at OSU, who has collaborated closely with the US Department of Agriculture on hop breeding. "I've had a blast working with hops. The unique features of the plant itself, the specialized equipment required to produce hops, and working with the hop and brewing industries have all made for an interesting experience," explains Dr. Townsend.

"I've seen some bizarre things in the breeding nurseries," says Dr. Townsend, including "a hop that smells like chocolate and a dwarf plant that is bright yellow. It almost glows."

Hop Smells

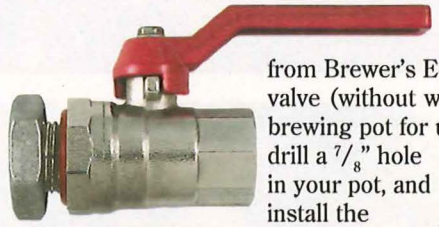
How would you like to spend a few hours sampling, discussing and describing various beers, as part of your job? What is a dream for many, is a reality for many people involved in the Aroma Hop Breeding Program. In fact, they decided early on to invite craft brewers along for the ride, including evaluating experimental hop characteristics and in choosing hop genotypes, and will eventually host aroma hop sensory panels to review the hops.

Early on, a "rub and sniff" process is used where the aroma of the hop is used to determine which hops move on to the next phase. "Anything that really smells good, and where the chemical profile looks really good, we will do test brews with those and they can play around with recipes to see if they really like them," says Townsend.

"You smell everything, from catty, you smell piney, you smell floral, you smell rose, you smell popcorn, you smell butter, you smell gym socks, nasty to really pleasant and some are really intense and some you can hardly smell. The whole gamut."

Although the sensory panels have not started, the sampling has begun. Earlier this year, they worked with the pilot brewery at OSU to brew a series of single hop pale ales in order to showcase specific aroma hops. Once they had the beer, they gathered a dozen or so expert brewers from the Northwest and conducted a sensory panel. This began the process of determining what craft brewers were looking for in hops. The results were unanimous, the brewers wanted variety. Solberg

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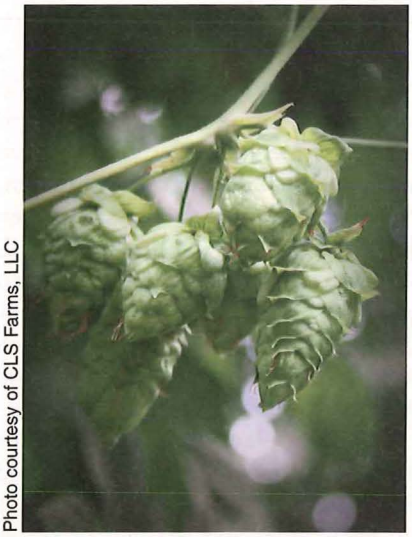


Photo courtesy of CLS Farms, LLC

El Dorado® hops ripening on the vine. Although high in alpha acids (16%), brewers are interested in its aroma.

Hop breeders are always developing new varieties and growers are producing some new hops that will give brewers hungry for substantial hop character something to chew on. This year and next year, be on the lookout for some new inspiration for hoppy goodness in your kettle.

El Dorado®

Sneaking onto the market is El Dorado®. The heritage of the hop is a proprietary secret. Only about 1.5 acres of El Dorado® was harvested in 2010 by grower Eric Desmarais of Yakima, Washington. Brewers Supply Group, which distributes El Dorado®, is hoping last year's supply of only 800 pounds will whet the appetites of the brewers who have tried it.

"Probably the most interesting characteristic is the aroma profile," says Sean McGree, manager of Brewer Supply Group's hop division.

"It has a very pleasant candy-like, cherry Life Saver flavor to it. It's proven to be very interesting to the brewers that we've talked to. They're clamoring to get the variety and are very much looking forward to the upcoming harvest."

According to McGree, the production this year has been expanded to 25 to 30 acres. Brewers Supply Group has contracted for 30,000 pounds (14,000 kg) of El Dorado®. However, 80% to 90% has already been spoken for.

El Dorado® weighs in 16% alpha acids, but McGree expects that to settle to 14% or 15% in subsequent harvests.

"What we're finding is that most of our customers are interested in its aroma profile," says McGree. "They're not really interested in the alpha acid. They love the oil profile and the flavor that it's imparting into their beer."

Flying Dog has chosen El Dorado® for their first single-hop beer — an Imperial IPA. Brewer Matt Brophy was first drawn to the new hop by the aroma, which he describes as having a subtle tropical fruit or dried fruit character.

"It's a little reminiscent of Amarillo®, but not as assertive in the final beer," says Brophy. "The beer that we brewed with it had a nice balance to it, even though it was coming in at about 75 IBUs."

Brophy thinks El Dorado® also would be well suited for a more traditional American Pale Ale. "I think it lends itself more to balance and reasonability than to extreme and assertive," he says.

HBC 369

Select Botanicals Group hit a home run with its Simcoe® hop a few years ago, and they're hoping a cross of that hop will make a similar hit. HBC 369 is so new that it doesn't have an official name yet. "HBC" is a company abbreviation that stands for "Hop Breeding Company."

"It's complex," says Jason Perrault, vice president for research and development for Select Botanicals. "It seems every brewer who brews with it that I talk to has a little different description for it. On the one hand, I get a lot of descriptions back saying it has a strong floral quality to it, but then I also get real strong soft fruit notes, a little bit tropical with some blueberry mixed in. Mango and tangerine have been used as descriptors as well."

Even though it hasn't been officially christened, HBC 369 is already making appearances in commercial beers.

Vinnie Cilurzo, founder of Russian River Brewing Company, served a beer brewed with HBC 369 at the keynote address of the National Homebrewers Conference in San Diego this past June. According to Cilurzo, "Happy Hops" had apricot, blueberry, peach, and mango characteristics that he attributed to the new hop.

It was the floral characteristics of HBC 369 that attracted Jim Koch of Boston Brewing Company and Sam Calagione of Dogfish Head Brewing. These brewers collaborated on a beer named "Savor Flowers" that featured rose water and a tincture infusion of flowers.

According to Koch, HBC 369 has "significant floral elements" and is "intensely floral and slightly fruity."

Calagione joked that HBC 369 should be named "Old People's Home."

It's doubtful that Calagione's suggestion will be the hop's final name. "More often than not, the name is just picked internally," says Perrault. "It's common in the past to name hops on a regional basis. For example, Simcoe® is the name of a portion of the mountain ranges around us as well as the name of a fort out here. But then, we'll also take notes from the actual sensory analysis. Citra, for example. That one we named based on the fact that we were getting a real strong citrus and fruity aroma from it."

HBC 369 has an alpha acid range of 10–12%. Only around 2,000 pounds (900 kg) of the new hop are expected to be harvested this year. HBC 369 is being propagated into nurseries for expansion next year. Perrault expects significant volumes to be available for crop 2012.

Galaxy

Not to be outdone, Australian hop growers are weighing in with a fruity hop variety of their own. Galaxy is grown by Hop Products Australia (HPA).

Simon Whittock, breeder for HPA, says Galaxy's mother plant is a failed high alpha variety that was ordered to be destroyed in the late 1970s. "The technician working on the program at the time felt that there was potential in the plant, and rather than culling it, he maintained a small plot without the knowledge of the plant breeder," Whittock says. "While that variety never made it as a commercial proposition, it has gone on to have significant value as a female parent in our hop breeding program."

Like El Dorado®, Galaxy is a fairly high alpha acid hop at 13.5–14.8%. However, brewers may not chose to use it for bittering. According to HPA, "When used as a late addition for flavor or aroma, it contributes a distinctive clean citrus and passionfruit character, which is more striking and intense the later the addition."

Galaxy has been used in a variety of beers from single-hopped lagers to cask ales. Carlton United Brewers brews a lager called "Pure Blonde Naked," which is said to have a "fresh fruit-salad aroma and flavor" credited to Galaxy.

Brew With The New

Some brewers are looking for new hops to contribute a compelling flavor and aroma component to give their beers a unique character. Hop breeders are working constantly to produce new varieties with characteristics not found in other strains. If you're looking for something new in your brew, check out these new hops.

— James Spencer

Thanks to Karl Vanevenhoven of Yakima Chief for help with this story.

recalls the brewers saying loud and clear, "We want more variety. We want more newness. We want more uniqueness. We want more ingredients to do unique things with."

"Hop chemistry is exceedingly complex and there are many things that we don't understand regarding this chemistry," says Dr. Townsend. Few have studied the intricate series of elements which come together to create the final unique hop aroma. Dozens of different hop oils interact with each other to provide the nuances of aroma and flavor. Add to that other influential factors, such as soil, conditioning and weather, and honing in on one particular flavor is quite complex." Although the program is focused on oils now, it hopes to eventually expand its focus to include the other chemical compounds that contribute to hop aroma and flavor. They are confident that by inviting craft brewers along for the journey, the program will have the thoughts and ideas from the end user in mind as they experiment. "We want to engage the people that will use this and have them help decide what goes forward," explains Dr. Townsend. After the characteristics have been identified, Dr. Townsend will set about the arduous task of breeding male and female hops to maximize these characteristics.

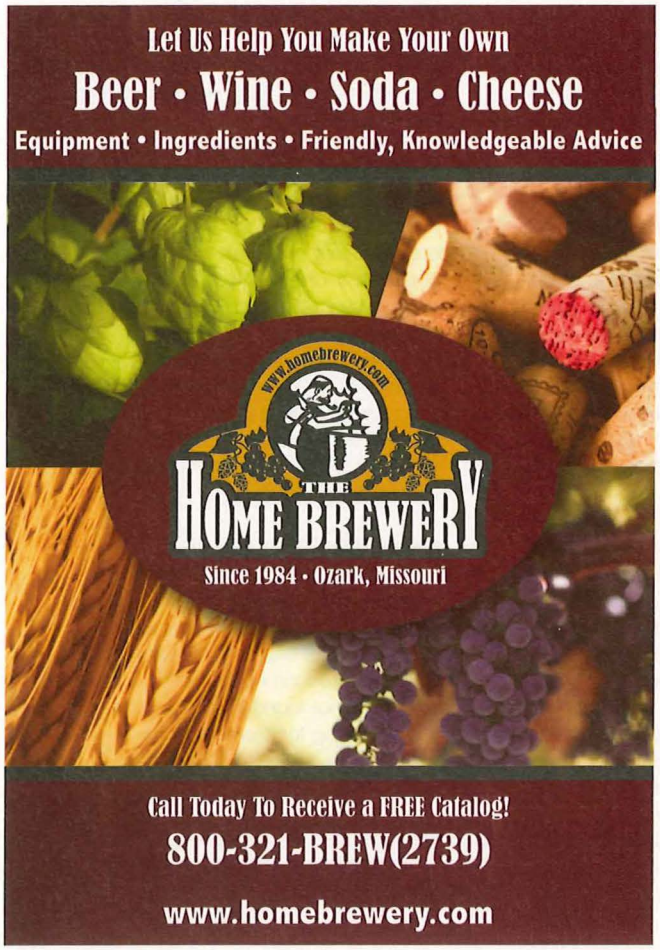
"The first thing is the smell. The second thing is a collaboration with Tom Shellhammer, the OSU food scientist that works with aroma and beer flavor," says Dr. Townsend. One thousand plants are currently being grown. From one specialized nursery, Dr. Townsend plans on harvesting around 150 hops for smell tests, and over time the program will evaluate between 200 and 300 plants a year. They will then send the hop samples in for lab work to correlate the chemical compounds in the hop with the smells.

Hop Sex

So how exactly does one "mate" hops? It takes a lot more than a beautiful sunset. "We collect pollen from a selected male plant," explains Dr. Townsend, "Just before a selected female plant is ready for pollination, we choose a sidearm (i.e. branch with flowers), clip the leaves off of that sidearm, and place a paper bag over that sidearm and staple it around the main stem. When the flowers are receptive, pollen is introduced into the bag, it's sealed, and shaken so that the introduction pollen distributes. Approximately 50-55 days after pollination, we collect the bags with seed, dry it all down, and then hand thresh and clean the seed."

A hop plant is either male or female. For now, the only way to find out whether a plant is male or female is to let it grow and see if it produces cones. However, cutting edge technology may have identified a molecular marker which identifies the sex of the hop. Such advancement could dramatically speed the process.

So far, Dr. Townsend has created 15 populations by crossing selected



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male and female parents, chosen for their desirable characteristics and collected thousands of seeds for planting. "It's just like people. It's really funny, except we get to throw away the bad kids," jokes Solberg.

"There are lots and lots of things to look at. In the end, out of the initial 4,000 seedlings I started with, maybe two or three will end up being a variety. It's a numbers game," says Dr. Townsend of this stage.

All of this talk of genetic manipulation and mutations had Frankenstein on my mind, so I asked Dr. Townsend what strange creations he has contemplated. With a huge grin he said, "Carnivorous plants. Then the hops could just eat the aphids."

The Farm

At the end of a winding gravel road in a remote part of the Willamette Valley, Oregon State University maintains a beautiful farm. Seventeen acres of the facility are used for breeding hops. Each section of the farm is distinct, from rows and rows of lush fifteen foot tall plants to the young plants that have just broken the surface.

"It's about a six-year process for the initial selections. It takes two years in the field to let the plants mature before we can collect much data."

The most fascinating section is where the survival-of-the-fittest is taking place. In this yard, the hops are subjected to harsh conditions, from downy mildew, powder mildew, aphids and other pests, and then studied to see which ones can survive. "It is a battle of the fittest . . . based on data and observations that we make over time," explains Dr. Townsend. "It helps us find the winners."

The Future

As a homebrewer himself, Solberg is thrilled about the future and has a front row seat to all of this experimentation. "Obviously homebrewing is a very different thing than commercial brewing, but at the same time, at the end of the day, it is the same thing," laughs Solberg. "The passion is the same." Sitting across the table from him at Migration Brewing in Portland, Oregon, his eyes sparkle. "I love seeing the creativity . . . you see what homebrewers do to try to come up with to get more flavor out of their hops and you see the systems that small brewers are putting together. I love this crazy effort to keep trying new things."

The next few years could be some of the most exciting years in craft and home beer brewing, offering everyone amazing new hop flavors to experiment with. Just think, in 2020 we could be toasting with hoppy beers, the likes of which we now currently can't even imagine.

Hop breeding is, as Solberg describes, "The relentless pursuit of that awesome beer experience." BYO

This is Joseph Alonzo's first story for Brew Your Own *magazine.*

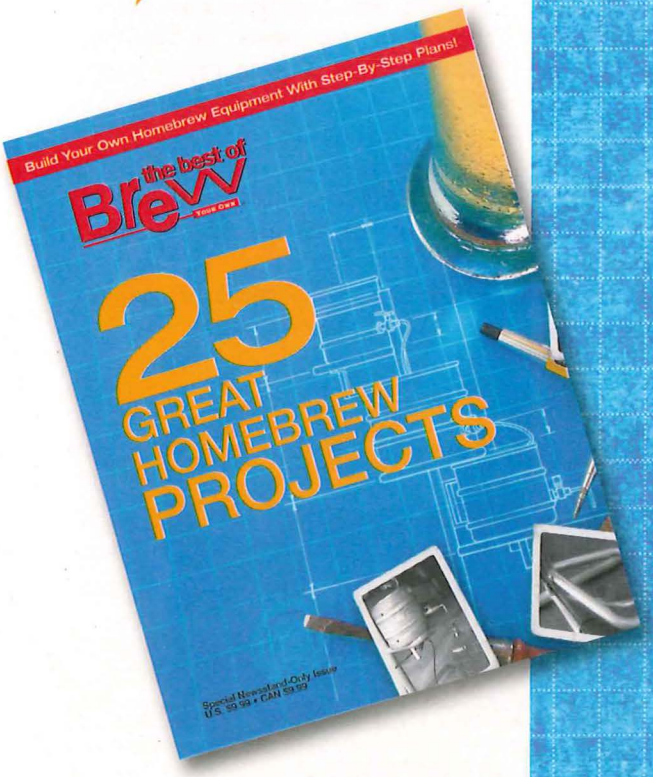




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Controlling Oxidation

Preserve the life of your homebrews

by Terry Foster



Most homebrewers will, at at some point, have a beer that tasted great when first kegged or bottled, but wasn't so great when tried again a month or so later. Hop flavor and aroma may have disappeared entirely, or the hop flavors may have become harsh and unpleasant. The beer could also taste of nothing more than wet cardboard.

Regardless of which of these scenarios occurs, we are talking about a great disappointment, perhaps an even worse disappointment than brewing a beer that did not turn out as well as you had hoped: oxidation.

There are several things that can spoil a beer in storage, for example, exposure to ultra-violet radiation producing "skunky" flavors. Then there's bacterial growth, which can result in a wide variety of unwanted flavors. But a variety of flavor changes occur during aging, some of which may be beneficial (depending upon the beer style), such as an intensification of caramel, toffee and wine-like flavors. Other effects are not desirable, such as a decrease in bitterness, development of that cardboard flavor, an increase in "catty" aroma, decrease in fruity (aka: estery) flavors, and a loss of freshness in general. Not all of these undesirable effects are fully understood, but many of them can be traced back to the effects of oxygen.

Oxygen may be the breath of life to humans, but when it is present in the bottle or keg it is the kiss of death to beer. No matter how cleanly you brewed your beer, when there is oxygen in the final container, its flavor can only go downhill. Just how quickly this can happen, and whether it involves the development of unpleasant flavors or simply loss of flavor and aromas, depends upon the type of beer, as well as when the oxygen first got to it.

How and when does oxygen affect your beer?

As you can imagine oxidation is of great concern to large commercial brewers. A great deal of research has been done on oxygen's effects, most notably on the effect of trans-2-nonenal, an aldehyde which has been shown to be the cause of the so-called cardboard flavor.

Although oxygen in itself isn't a particularly reactive molecule, it can be made to produce various peroxy compounds and even free radicals, especially in the presence of ferrous (Fe^{++}) or cuprous (Cu^{+}) ions. These are known as "reactive oxygen species" and can oxidize various beer components, such as lipids, to produce aldehydes such as acetaldehyde. For example, linoleic acid is oxidized to trihydroxyoctadecanoic acids, which are then converted into trans-2-nonenal. Such reactions are not necessarily fast, as they may go through two or more stages to reach the offending molecule, which is why oxidative degradation generally only occurs gradually during storage, depending upon when the oxygen was picked up.

So when is oxygen picked up in the brewing and packaging process? The short answer is at every stage. Therefore brewers like to talk in terms of "hot-side aeration" and "cold-side aeration." The "hot side" includes oxygen pick up during mashing, wort transfer (run-off), boiling and whirlpooling. The "cold side" occurs mainly post-fermentation, when the beer is transferred from one vessel to another, during filtration — and, most crucially, at packaging.

Aha! You respond, why do we bother with controlling oxygen pick-up on the hot side, and then deliberately oxygenate the wort at the fermentation stage? I think the answer to that runs along the lines that hot-side aeration is irreversible. In other words, oxygen pick-up when the wort is at 80 °F (27 °C) or more will result in the formation of staling compounds (or their precursors) relatively quickly, since most chemical reactions increase

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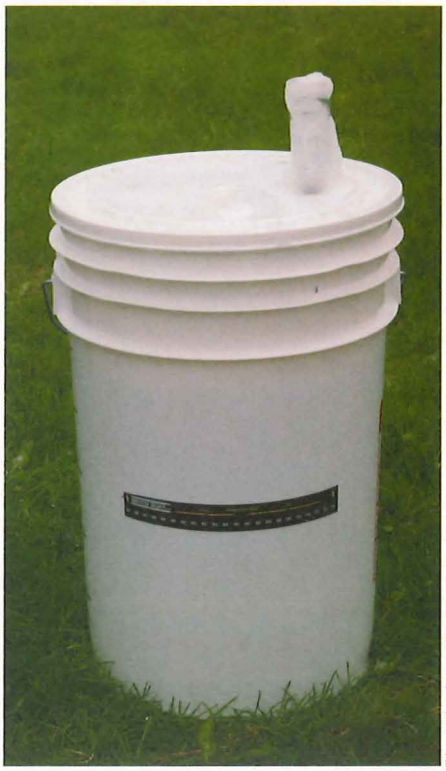


Photo by Les Jörgensen

in rate with increasing temperature. This means that the nasties are there before you get to fermentation, where they will stay right through to the finished beer. But when you oxygenate the wort as you pitch the yeast, the oxygen serves a different purpose, because it is there as a vital nutrient to the yeast in its early growth stages. Once fermentation gets well and truly underway, the huge volume of CO_2 produced is going to scrub out virtually all the oxygen that the yeast has not used.

Quantifying the effect of oxygen pick-up at any particular stage relative to that of another stage is difficult, and as I have said earlier depends upon the style of beer, how long you want to store it and how carefully you have handled the beer during brewing. There's only one foolproof way in which you can really test for degradative oxygen pick-up, and that is by tasting the beer after storage, by which time it's too late to do anything about it! Commercial brewers both large and small take the view that they should do their best to control this problem at every stage of the brewing process. As a result they have a pretty good handle on beer staling, and you are likely to get only a quality bottle or can of your favorite brew from a liquor store these days.

Of course you can buy (and probably have bought) a bottle that is well past its best, but if so that is more likely the result of abuse during storage. This occurs most often with beers that have simply spent too much time in packaging after brewing before it was sold, which of course is very common with imports. Remember what I said earlier - once it has been shipped out of the home or commercial brewery, the beer is going downhill.

How do we control oxidation?

We should always be prepared to learn from the professionals, so we too have to look at limiting oxygen take-up in our brewing procedures. Even commercial brewers can't eliminate oxygen entirely, but they do get it down to much lower levels than we are likely to achieve at home. Just remember, though, that the less oxygen you have in your beer, the better it will keep.

The first step is to check your water supply to make sure that it has low copper and iron levels (below about 1 ppm). You should be okay with public supplies of drinking water, as utilities have to conform to EPA standards of 1 ppm and 0.03 ppm respectively. If you're not sure about your water, ask your utility — they're usually very helpful in explaining water analyses to inquirers. Well water may be a different proposition in terms of these metals, so spend a little bit of cash and have it analyzed, then change your source if it is not suitable, at least for brewing purposes.

Perhaps more of a potential problem is pick-up of copper and iron ions during processing. Ferment your beer in only plastic, glass or stainless steel. Stick to stainless for all

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heating applications. I know copper vessels were used in brewing for countless centuries, but that was because copper was available and readily formable, and because brewers knew nothing about oxygen pick-up. Modern brewers may still boil in a "copper," but would not dream of making it from anything else but stainless!

The best thing you can do to prevent hot-side aeration are the simple steps of minimizing stirring during mashing and avoiding splashing during wort run-off and transfer to the kettle. If you are using a pump, make sure it is a type that will not leak and admit air - the magnetic impeller types that are widely available from homebrewing suppliers are fine. I realize that it is not easy to avoid splashing if you have to transfer a hot liquid from one vessel to another. For example, extract brewers with limited capacity often perform a partial-volume boil and add the wort to cold water to reach final volume. Use a plastic vessel (not glass!), and pour the wort carefully and slowly into the water, preferably down the side of the vessel. Stir gently at first until the liquid is at an even temperature, then pitch the yeast and stir vigorously, or oxygenate. If you are using a glass fermenter, siphon the pitched wort into it with as much splashing as you like — this is the one point where that is okay!

When it comes to cold-side aeration, much of the same basic advice applies — avoid splashing the wort or beer as much as possible, check all the seals on things like in-line wort chillers, and if using a pump make sure it is of a type as described earlier. Racking must be done carefully. Make sure the exit end of the siphon is on the bottom of the receiving vessel and stays below the surface of the beer throughout the operation. And if the beer is to sit in a secondary fermenter, make sure that it is tightly sealed. A secondary fermenter is definitely a danger area as the beer will lose CO_2 after a while, making it possible for air to get in through the lock (or through a poor-fitting cork) and do some damage. In fact, a stainless soda keg is ideal for secondary fermentation, as you can purge it with CO_2 before racking and then purge the head space with the gas when the keg is full. Follow similar precautions if you filter the beer.

This brings us to the final stage: kegging and bottling, both areas where significant oxygen pick-up can occur, particularly if the beer is racked into a bottle or keg that is full of air. As explained above, this should not be necessary with a keg, as it can be purged with CO_2 first, and the beer siphoned in without splashing. I like to seal the keg then purge the head space three times with the gas.

Bottling is probably the most dangerous area for oxygen ingress, since it entails a large number of separate fills. Simple careful siphoning and capping (leaving a ½-to 1-inch head space) is going to leave air in the headspace. Sure,

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you'll have yeast present in the bottle, and since our friendly fungus has reducing properties it will use up oxygen as it ferments and conditions the beer. But it probably won't use up all of the oxygen, and also you want as little yeast as possible present. This is because once the yeast has fermented out the priming sugar, it will die and autolyse, or break up and feed on its own nutrients, which can cause a variety of problems with beer storage stability.

The better option with bottling is to use a counter-pressure filler, which you can either make (see *BYO's 25 Great Homebrew Projects* special issue) or buy. I find these very useful, as the one I use allows CO_2 purging of the bottle, permits fobbing of the beer (that is, allows the beer to rise right to the top and just flow over a little), but leaves an appropriate head space when the filler lance is removed. You can also purge the headspace with the gas before the bottle is capped. This means that you can also bottle beers with virtually no yeast present, without needing to filter it, but you must have stored the beer in a keg and chilled it under CO_2 before bottling. That will require a keg-and-gas delivery system.

Bottle caps can be a source of oxygen contamination, particularly if they are carelessly applied. Oxygen scavenging caps are available with a chemical in the lining that is supposed to eat up oxygen. I can't find what the chemical is that is used, and I don't know that the caps actually work in this way; however, they do seem to provide a tighter fit than most regular crown caps, which is enough of an advantage to warrant paying for their higher cost (about twice that of regular closures).

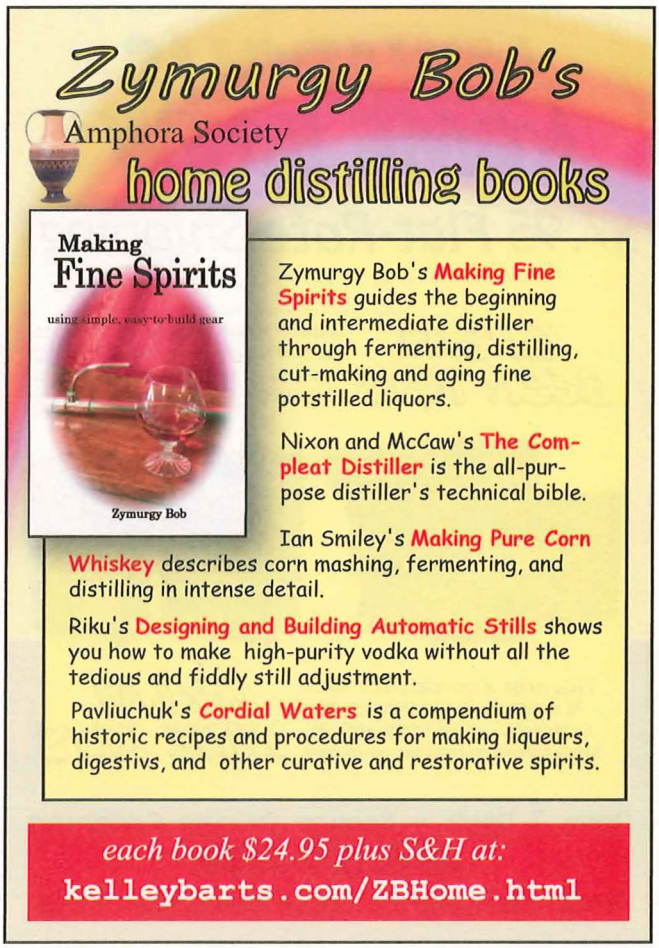
And of course, there's the question of storage temperature. Most experienced brewers will tell you to keep your beer chilled, and I would generally agree with that advice. However, an article on storage conditions in the March-April 2011 issue of *BYO* suggests that "cellar" temperature may also be suitable, and that even short spells at room temperature may do little damage to the beer. Cellar temperature is around 55 °F (13 °C).

And in conclusion

An obvious approach would be to use antioxidants, and potassium metabisulfite as well as ascorbic acid have at times been used by commercial brewers. However, they both have side effects that can cause other unpleasant flavors during long storage of beer, and I do not recommend their use. Follow my earlier recommendations, and you should have little problem with keeping your beer. And remember, there is always the option of avoiding potential trouble by drinking it quickly! BYO

Terry Foster writes the "Techniques" column in every issue of Brew Your Own.





Colloidal Stabilization

Controlling beer haze

by Chris Bible



Beer is a complex beverage that continues to change even after the brewing process has been completed. Hundreds of different compounds exist within a beer and these compounds can interact at a molecular level if the conditions in the beer allow it. Chill haze formation in a beer is an example of this type of interaction.

If a beer is susceptible to chill-haze formation, it is said to exhibit "colloidal instability." A colloid is a dispersion of solid particles having effective physical dimensions of between 1-1000 nanometers (nm) within a liquid phase. Colloidal instability means that there is a tendency for several substances to form a colloidal suspension within the beer when conditions are favorable. Colloidal instability in beer is primarily caused by the interaction of proteins and polyphenols.

A beer that has the ability to resist the formation of colloidal suspensions that cause turbidity or haziness within the beer is said to exhibit colloidal stability. To understand how to make a beer that exhibits colloidal stability, it is necessary to understand how beer changes as it ages, and how to best control the interaction between proteins and polyphenols. There are three important changes in beer that occur due to interaction between proteins and polyphenols:

- Haze formation due to precipitation of a colloidal complex of proteins and polyphenols
- Increases in harshness or unpleasant aftertaste in beer
- Darkening color, particularly following oxidation

Haze — whether chill-haze or permanent haze — is the result of the formation of an insoluble colloid-complex from soluble proteins and tannins (polyphenols) formed during the brewing or fermentation process. This colloidal complex is relatively soluble at room temperature, but is much less soluble at the cooler temperatures at which beer is typically served. The tendency to form chill haze increases as beer ages and begins to oxidize. Oxidation of some polyphenols, especially flavanoids, creates polymerized products that are active precursors in haze formation. The presence of these compounds within beer can lead to permanent haze formation. Figure 1 (on page 62) illustrates this process.

To avoid colloidal haze in beer, the brewer must properly select the brewing ingredients, properly control the brewing process, and properly store the finished beer. Specifically, a brewer must:

- Control the protein content of the beer
- Control the polyphenol content of the beer
- Control the physical conditions during brewing, packaging and storage

Controlling the protein content of the beer

Proteins in beer are derived from the barley malt and from adjuncts such as wheat. Protein is broken down during malting and mashing to produce haze precursors. The haze-active proteins found in beer are largely derived from barley and consist of hordeins (prolamines) that have a strong attraction to polyphenols. These same proteins are also the source of the amino acids necessary for yeast growth, and some of these hydrophobic proteins provide stability to beer foam and enhance the texture and mouthfeel of beer. The brewer must reduce protein content to improve the colloidal stability of the beer while retaining enough of the right kinds of protein to ensure that desirable organoleptic characteristics are retained in the finished beer.

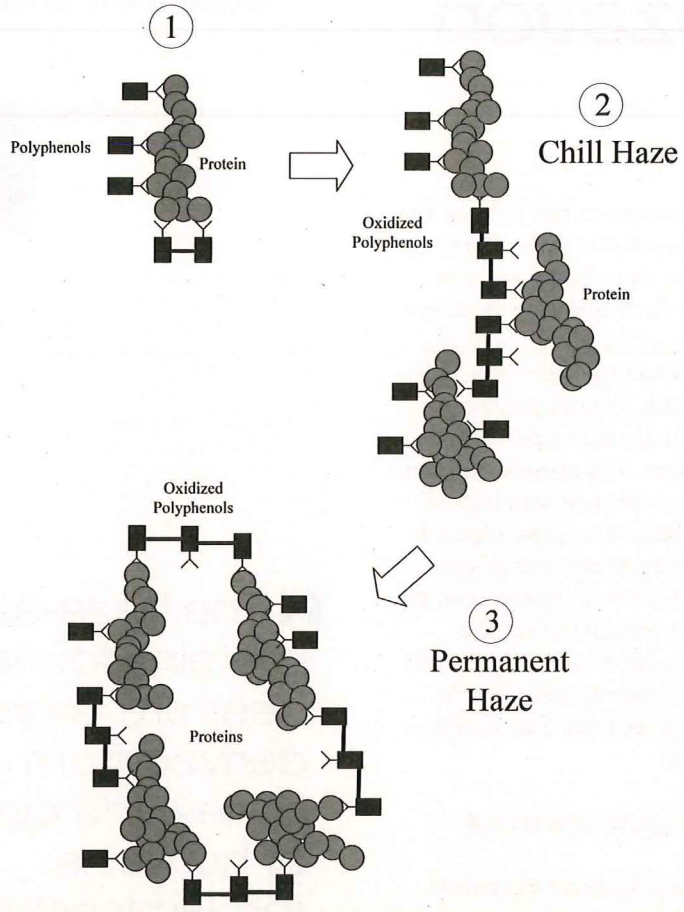
Ways of reducing the protein content of a beer include selecting malts that have low nitrogen content (1.6–

"The haze-active proteins found in beer are largely derived from barley and consist of hordeins (prolamines) that have a strong attraction to polyphenols."



Photo by Charles A. Parker/Images Plus

Figure 1: Permanent Haze Formation



1.8% nitrogen), using adjuncts that have low nitrogen content and using under-modified malts. This reduces the amount of protein extracted, but this must be balanced by proper proteolysis during the mashing process.

Ensuring that the wort boil is strong so that hot-break formation is maximized reduces the protein content in beer. Likewise, ensuring that the post-boil cooling of wort occurs rapidly in order to maximize cold-break formation reduces the level of proteins. Proteins from the hot and cold break are left behind when the wort is moved to the fermenter.

Using kettle finings such as Irish moss to maximize the formation of hot and cold break will also help reduce protein levels. Table 1 (on page 63) summarizes the actions of several common fining agents.

Controlling the polyphenol content of the beer

Polyphenol concentrations typically

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Table 1: Properties and Dose Rates of Common Fining Agents

Substance	Mechanism of Action	Typical Dose Rate
Papian (enzyme)	Modifies protein molecules to inhibit reaction with polyphenols	2 – 6 g/hl
Tannic Acid (tannin)	Addition of tannin (a polyphenol) forces chill haze reaction to completion. Colloid can then be filtered out.	5-8 g/hl typical
PVPP (polyvinylpolypyrrolidone or polyclar)	Adsorbs Polyphenols	2 tsp/5-gal batch or 7.5 –25g/hl typical (up to 50 g/hl)
Bentonite	Absorbs/Coagulates Proteins	6-20 g/5-gal
Silica Gel	Absorbs/Coagulates Proteins	45–360 g/hl (6 – 10g/5-gal)
Gelatin	Adsorbs proteins and acts as a yeast flocculant aid	½ - 1 teaspoon/5-gal (target 60-90 mg/liter*)
Isinglass	Adsorbs proteins and acts as a yeast flocculant aid	½ - 1 teaspoon/5-gal (target 15-60 mg/liter*)
Irish Moss (seaweed)	Absorbs/Coagulates Proteins	½ - 1 teaspoon/5-gal (1-2.5 g/5-gal)
Whirlfloc	Absorbs/Coagulates Proteins	1 tablet/5-gal (20-60 mg/liter*)

* Note 1 mg/liter = 1 ppm by weight

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— Wes Gauthier
Brewer, Terrapin Beer Co.
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range from 50-150 mg/liter (ppm) in lager beers. Polyphenols in beer originate in the hops or in the husks of the malt that is used to make the beer. The polyphenols that are derived from hops are usually extensively polymerized and tend to precipitate out with the hot and cold break. These polyphenols generally do not impact the colloidal stability of beer.

Malt-derived polyphenols are extracted during mashing and wort separation. Most of the malt-derived polyphenols are extracted near the end of the runoff. These polyphenols tend to be ones that negatively impact the colloidal stability of beer. Ways of reducing the polyphenol content in beer include stopping runoff before the density of the runnings drop to 1 °Plato (SG 1.004) or less, keeping sparge water at a pH of less than 7 and using a higher ratio of adjunct to malted barley (recipe permitting).

Controlling the physical conditions during brewing and storage

By paying careful attention to the important variables during the brewing process, a brewer can reduce the level of the protein and polyphenols in the finished beer. Minimizing the amount of proteins and polyphenols in the finished beer is the preventative way of improving colloidal stability. If the precursors to chill haze are minimized, the potential for haze is likewise minimized.

Other ways of improving the colloidal stability of beer include cold (-2 °C/28 °F) filtration and storage. Cold encourages the formation of chill haze that can be removed by filtration or flocculation. Adding stabilization or flocculation aids such as PVPP or silica gel to the finished beer immediately prior to packaging also helps. PVPP will bind to polyphenols and silica gel will interact with proteins. Minimizing beer contact with oxygen during packaging and storage also reduces haze. Haze formation can occur as a result of oxidation of polyphenols, so reducing contact with oxygen will reduce the rate of haze formation and increase colloidal stability. Finally, haze is reduced by ensuring that the finished beer's pH is greater than 4.2. Protein interaction with polyphenol is dependent on electrostatic attractions between the two compounds. This interaction is reduced when beer pH is greater than 4.2.

Colloidal conclusion

Beer continues to change after the brewing process and may exhibit some degree of colloidal instability if conditions are right. A brewer can improve the colloidal stability and shelf-life of a beer by paying careful attention to the important brewing variables and by controlling the physical conditions of the beer during conditioning and storage. BYO

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





Brews to Go

Build a hardwood beer box

by Ron Hodgen



Homebrewers are always looking for ways to improve their craft and enhance their homebrews - both in the beer and in their hand. Many people like to create new equipment and recipes. Others use their artistic skills to create custom logos and bottle labels to enhance the presentation of their beers. Me, I like to work with wood, so after creating my own logo and labels I decided to create unique boxes to carry six packs of 12-ounce bottles of my own brews. I have found that the boxes are not only handy for transferring beer from place to place, they are also a great way to giftwrap a six-pack of homebrews.

Woodworking has been a hobby of mine for several years, so I decided right from the start that the box must be made of wood. I've experimented with several different designs and box joinery styles. I've used oak, cherry, walnut or elm for the sides, but the wood species is really up to the individual builder. I've built these boxes using dovetail joints, box joints or rabbet joints, but for this story I went with rabbet joints as it makes construction fairly simple. (A rabbet, also known as rebate, is a recess or groove cut into the edge of a piece of machineable material). Cutting dovetail or box joints, for example, is more difficult. The sides of my boxes are either ¾-inch or ½-inch thick. The boxes with thicker sides are heavier, but look better than boxes with thinner sides in my opinion. I use ⅛-inch thick plywood for the box bottoms and bottle dividers.

In addition to the structural design I settled on, I also wanted my boxes to have an old-time nautical look, so I chose manila rope for handles. My original design had rope ends tied to inexpensive cabinet drawer pulls attached to the box ends using half hitch knots, but the half hitch knots in ¾-inch rope ended up being bulky, so I've since switched the design to include eye splice knots. The eye splice knots are wrapped with leather shoelaces to tighten the knots and give the box a better look. I've also swapped out the inexpensive cabinet pulls in favor of 4½-inch (11-cm) black plastic boat dock cleats to further enhance the nautical look.

The following instructions include details on how to build my 6-pack beer box with ¾-inch sides using rabbet joints. If you enjoy working with wood, this is a fun project to show off your homebrews at your next family gathering or homebrew meeting. And if you aren't familiar with woodworking, this shouldn't be too much of a challenge with a little guidance from a friend with some woodworking experience (and hopefully some tools, too!)

> "Woodworking has been a hobby of mine for several years, so I decided right from the start that the box must be made of wood."

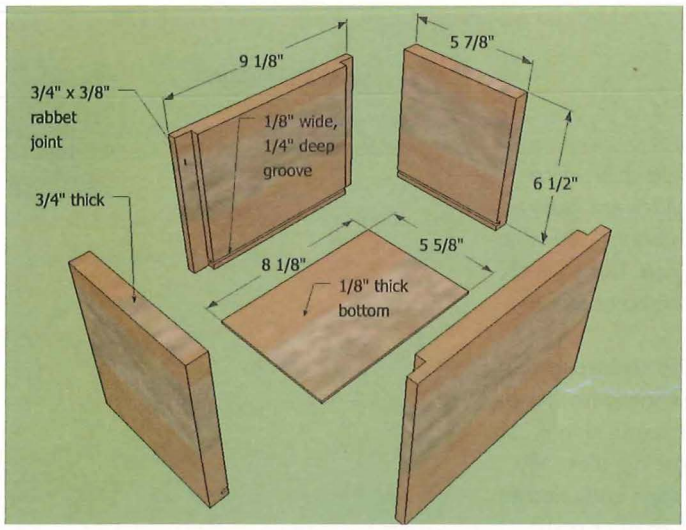
Parts and Supplies List

1-inch x 8-inch x 3-foot (~ 2.5 x 20 cm x 91 cm) hardwood
⅛-inch x 12-inch x 18-inch (~ 0.125 x 31 x 46 cm) plywood
5 ft. (1.5 m) of ⅝-inch or ¾-inch manila rope
(2) 72-inch (183-cm) leather shoelaces
(2) 4 ½-inch (11-cm) plastic dock cleats
electrical tape
masking tape
(4) 1⅝-inch black drywall screws
wood glue
danish oil (or other finish)
furniture wax
sandpaper

Tools:
table saw
band clamp(s)
measuring tape
scissors
phillips screwdriver



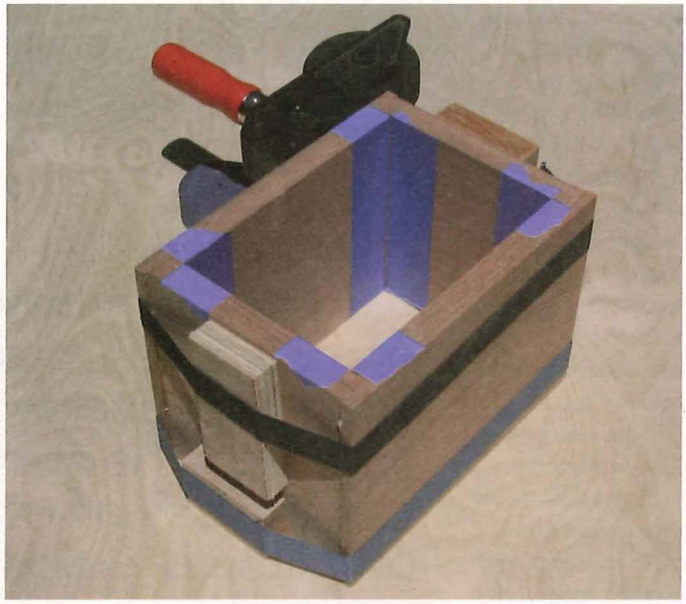
Homebrews displayed in a homemade six-pack box like this make great gifts for your beer-loving friends.



1. CUTTING THE BOX PANELS

First, rip the side/end material to a width of 6½ inches (16.5 cm). Then crosscut two end pieces at 5⅞ inches (15 cm) long and two sides at 9⅛ inches (23 cm). Then cut rabbet joints in the ends of the side panels with a router or table saw. The rabbet joint should be ⅜-inch (1 cm) deep by ¾-inch (1.9 cm) wide.

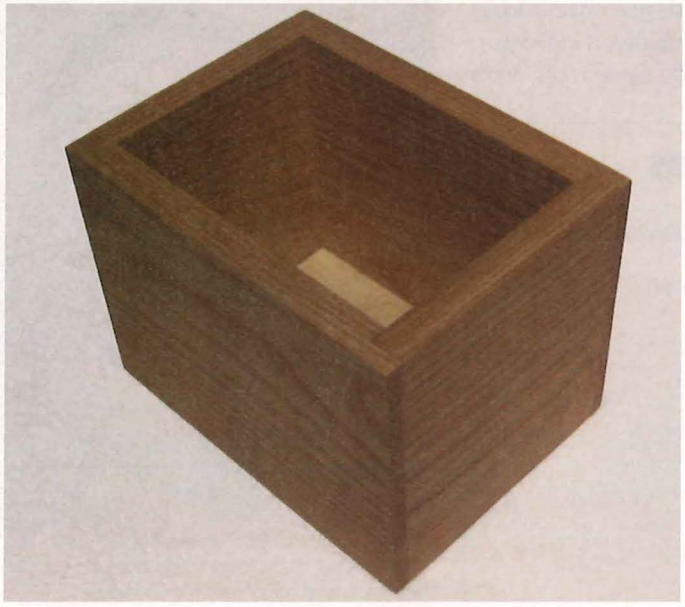
Cut a slot in the inside faces of the side and end pieces to hold the plywood bottom for the box. I make the groove ¼-inch (0.64 cm) deep and ¼-inch (0.64 cm) above the bottoms of the side and end pieces. If necessary, make another pass with the table saw to remove just enough material to allow a semi-snug fit for the bottom. Then cut the ⅛-inch (0.32 cm) thick bottom plywood piece to 5⅝-inch x 8⅛-inch (14.3 x 21 cm). Thoroughly sand the inside faces of the end and sides.



2. BOX ASSEMBLY

Woodworkers' glue holds the box together. First, apply masking tape to the inside of the end and side panels along the inside side/end joint lines. The tape should not extend below the top of the bottom groove.

Slip the bottom plywood into the groove and dry fit the entire box together to see if everything fits ok. Trim the bottom if needed to get a tight dry fit. Make sure that the masking tape is properly placed. The tape pieces should meet at the inside corners, but not be pinched by the bottom or sides. Apply a thin layer of glue on the ends of the end pieces and on the rabbet joints of the side panels. I do not glue the bottom. Assemble the sides, ends and bottom, making sure that the assembly is square, then clamp the assembled box. Carefully remove the masking tape to remove any glue squeezed out during clamping. Wet and remove any glue that may be left on the inside of the box. Let dry overnight.



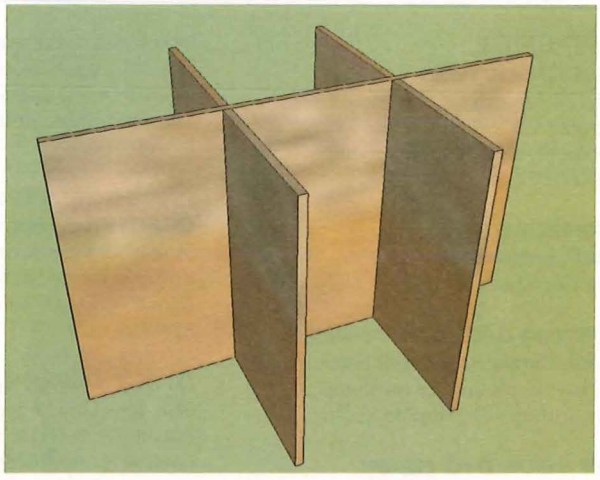
3. FINISHING THE BOX

Thoroughly sand the outside of the box making sure that the corner end grain is smooth and flush with the ends. Also make sure that all glue remnants are sanded off. A fine crack may remain along the outside of each rabbet joint. I minimize these cracks by sanding a glue/sawdust mixture into the crack, sanding smooth until the cracks are filled and glue is gone. This practice will produce a more attractive joint. The box may initially be wobbly sitting on a flat table surface. Simply put a large sheet of sandpaper on the surface and move the box back and forth over the sandpaper until the box sits flush on the table. The top of the box can be sanded in the same manner. I do not sand the plywood bottom.

I normally apply Danish oil and wax to my oak, cherry, walnut and elm boxes, but almost any type of finish will do. I do not apply oil to the plywood bottom. Wait a few days and then apply a furniture wax to all surfaces.

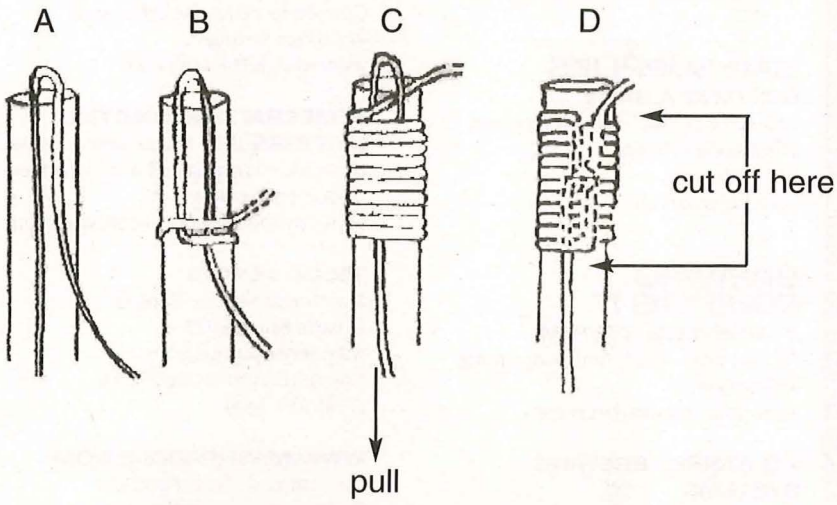
4. BOTTLE DIVIDERS

I make bottle dividers out of ⅛-inch (0.32 cm) plywood. Cut one piece to 4½-inch x 7⅝-inch (11.4 x 19.4 cm). Cut two more pieces at 4½-inch x 5⅛-inch (11.4 x 13 cm) each. Cut two slits half way through the width of the longer piece at 2½-inch (16.4 cm) from each end. Cut one slit half way through the width of the smaller pieces at the middle of the pieces. The slits need to be slightly wider than ⅛-inch (0.32 cm). Piece together as shown to the right by aligning the slits in the long piece with the slits in the short pieces. Install in the box for a test fit. Trim dividers as needed, and apply furniture wax.



5. THE HANDLE

The handle is manila rope, 4½-inch (11.4 cm) plastic boat dock cleats and leather shoelaces (72 inches/183 cm long). Start with a 5-foot (~1.5 m) piece of ⅝-inch (1.6 cm) or ¾-inch (1.9 cm) diameter manila rope. Unravel 6 inches (15 cm) from one end and wrap electrical tape around the ends of each of the three rope strands. Wrap tape around the rope at 6 inches (15 cm) from the end to prevent further unraveling. Create an eye splice knot making sure that the inside of the eye is 2 inches (5 cm) wide (go to www.animated-knots.com/splice/index.php for more detailed instructions). I do two tucks for each of the strands, then I cut off the excess strands and wrap the splice with electrical tape. Rough fit the rope assembly to the box to determine where to begin building the eye splice knot for the opposite side. (My rope handles are 27 inches (69 cm) long from outside to outside of the eye splices after both eye splices are tied.) Tie the second eye splice, cut off excess rope strands, and wrap the eye splice with a band of electrical tape.



6. FINISHING TOUCHES

Wrap shoelaces over electrical taped portions of the rope as shown above. The shoelaces are both decorative and helpful in stabilizing the eye splice knots.

Slip the plastic boat dock cleats through the rope "eyes" and attach to each end of the beer box. I tend to attach mine about 2 inches (5 cm) from the top — using the 1⅝-inch black drywall screws.

Finally, when you have everything put together, load the beer box with six of your favorite homebrews and enjoy — or load it with beers to bring to give away! (BYO)

Ron Hodgen is a homebrewer and woodworker from Morris, Illinois. This is his first article for Brew Your Own.



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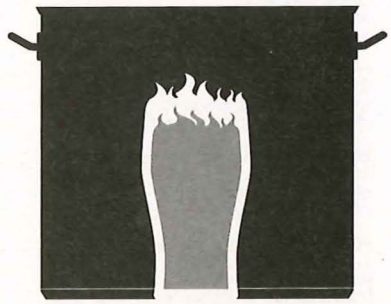
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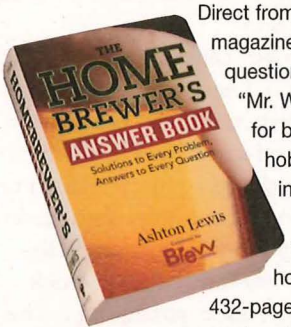
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Wort Stories

How I became a homebrewer

Tim Matson • Thetford, Vermont

I didn't get serious about making beer until the 70s, but I trace my brewer's roots back to the 50s when I was at school in the woods of northwest Connecticut. One year, five of us bunked in a small dorm called somewhat ominously, "The Workshop."

Every fall during apple season, the five of us would troop down to the general store at the bottom of the hill and each buy a gallon of cider. The idea was to bring a jug to an ancient tobacco barn where we watched old black-and-white movies every Saturday night. I'm not sure where the idea came for what happened next — maybe one of those Cagney jailhouse pictures where the convicts make hooch with yeast and sugar stolen from the mess hall. Anyway, instead of taking the cider to the movie we got one of the cooks to give us some bread yeast and bagged a bowl of sugar from the dining room. The sugar and the yeast went into the glass cider jugs, which we capped off tight, imagining the swell concoction we'd make. We hid the bottles in the back of the communal closet we all shared. On Saturday night, while we watched bombs exploding in a World War II movie, the bottles in the closet also exploded, saturating all of our suits, ties, button-down shirts and shoes in yeasty semi-alcoholic cider.

The next day, Sunday morning, the entire school had to show up for chapel in three-piece suits for communion. We sniffed our soaked suits, winced and feared the dilemma: if we skipped chapel we'd wind up with hours of chores like washing windows, mopping floors and whatever other horrors the prefects could imagine . . . not to mention possibly going to hell. Courting sacrilege, we donned our suits and went to chapel. It didn't take long for everyone nearby to snicker, pinch their noses and clear a circle around us.

What happened next has always puzzled me. Perhaps it was a sermon of forgiveness from the altar, or the smell of communion wine masking the tweedy cider, but after the service we went back to the dorm, cleaned up and not a word was said. Was closet brewing an unspoken tradition, and we'd passed some magical muster? Whatever it was, looking back I suspect that's where I caught the brew bug.

Except for that explosive batch of cider, I hadn't made a drop of hooch for almost 20 years when I became a part of the back-to-the-land movement in Vermont in the 70s. At first I was building houses and growing gardens, which can work up a big thirst. There was just enough information out there at the time to encourage me to find a way to make an alternative to the mediocre beers generally available back then. Inspired by a few articles in *Mother Earth News* and some obscure underground pamphlets, the memory of that boarding-school cider adventure came back. (There was also the taste of a few surviving independent beers like Naragansett Porter to lead me on.)

So I bought canned cooking malts (Blue Ribbon, featuring Lovely Lena with the next door face), bread yeast and sugar and saved my Naragansett bottles, which were sturdy enough to rinse out and recap. And when I didn't have enough bottles I just drank the stuff out of the fermentation crock, usually a big plastic garbage can. The fancy fermenters, hydrometers, roasted barley and Oregon hops came later — there were hops for free growing around abandoned cellar holes all over Vermont. Those old timers knew what they were doing! BYO

Tim Matson is the co-author of Mountain Brew, *a guide to homebrewing, which was first published in 1975 and is now back in print.*

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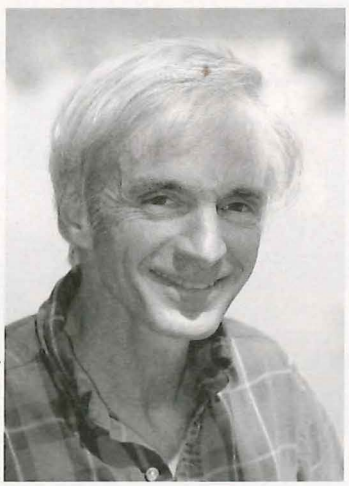


Photo courtesy of Tim Matson

Tim Matson started making his own beer in Vermont in the 1970s.

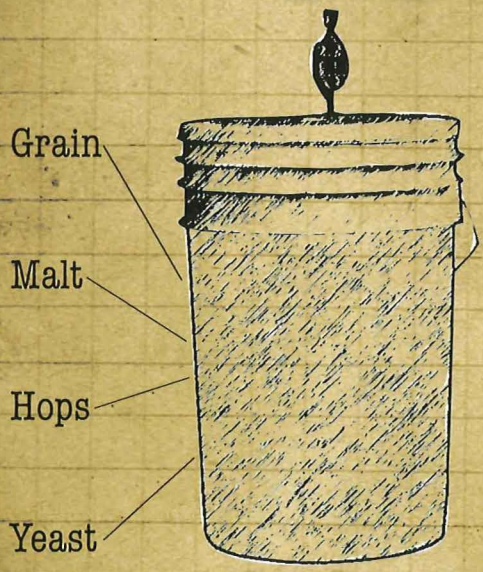
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