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JULY-AUGUST 2004, VOL.10, NO.4

THE HOW-TO HOMEBREW BEER MAGAZINE

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DARK ABBEY type for 9 l.
Starting specific gravity : 1.070 Alcohol content : 8 %.
One of the most well known Belgian specialties : an Abbey style beer with vinous character due to its high alcohol content. Deep amber, full flavoured with lots of malt aroma with caramel notes. Improves with long maturation times and can be kept for several years !

AMBIORIX type for 15 l.
Starting specific gravity : 1. 060 Alcohol content : 6,5 %.
Amber beer with a red copper tint. Slightly acidic palate at first but with a nice fruity aroma. Moderate hop bitterness. Comparable with the well known beer of Roeselare.

DIABOLO type for 9 l.
Starting specific gravity : 1.071 Alcohol content : 8 %.
Belgian specialty beer : Strong, golden coloured beer with a thick and long lasting head (lacy). Characteristic aroma of devil type Belgian beers, soft palate with a slightly sweet aftertaste. Improves with long maturation times and can be kept for several years !

KRIEK type for 12 l.
Starting specific gravity : 1.053 Alcohol content : 5,5 %.
Kriek is the best known of the famous Belgian fruit-beers, made by macerating cherries in beer. A slightly acidic, sweet aromatic beer with a red topper tint. Each kit contains pure cherry juice of at least 3 kg of cherries ! This beer gives you the perfect balance of fruitiness without tasting like grenadine as some commercial kriek's do.

OLD FLEMISH BROWN type for 12 l.
Starting specific gravity : 1.060 Alcohol content : 6 %.
A dark brown beer with a woody notes flavor a slight liquorice aftertaste that also compares with the Dutch Bock-beers.

CHRISTMAS type for 7 l.
Starting specific gravity : 1.065 Alcohol content : 8%.
Dark, strong and full-bodied Belgian beer, sweeter than Abbey style beers. Strong malt flavour and aroma. Improves with long maturation times and can be kept for several years !

WHEATBEER type for 9 l.
Starting specific gravity : 1.053 Alcohol content : 5%.
Very similar to the well known Belgian "Witbieren" : pale, opaline colour with low alcohol content. A real summer beer with a pleasant aroma, mild hops and a smooth malt character. Slightly acidic and thirstquenching. Based on an old recipe using barley, wheat, oat flakes and a secret herb mixture with coriander and sweet orange-peel.

GRAND CRU type for 9 l.
Starting specific gravity : 1.075 Alcohol content : 8%.
Gold opaline coloured, with strong flavour of grains and even bread. Very little hop aroma. Very mouthfull with light fruit notes and a pleasant sweetness. Also this kit contains wheat malt and a special herb mixture.

TRIPLE type for 9 l.
Starting specific gravity : 1.075 Alcohol content : 8%.
Triple is a well known, deep golden coloured, Belgian specialty. Due to its high malt contents it has a very pleasant aroma and taste, mouthfull, full bodied and even a bit herbaceous. High alcohol content.

FRAMBOOS type for 12 l.
Starting specific gravity : 1.053 Alcohol content : 5,5%.
FRAMBOISE or raspberry beer, is a Belgian specialty. Together with the BREWFERM KRIEK, this FRAMBOISE is the only fruitbeer kit available in the world. Each kit has an equivalent of 2 kilo of raspberries. This FRAMBOISE beer han a very delicate aroma and is ideal as a refreshing summer-beer or as a surprising aperitif !

PILSNER type for 15 l.
Starting specific gravity : 1.042 Alcohol content : 4,6 %.
Light, blond beer, with a moderate bitterness and dry finish, comparable with the commercial Lager or Pilsner beers. Low alcohol content.

GOLD type for 12 l.
Starting specific gravity : 1.053 Alcohol content : 5,5 %.
A real deluxe pilsner type with more malt flavor than the normal Lagers. Moderate hop bitterness. Comparable with the Scandinavian deluxe-Beers.

GALLIA type for 12 l.
Starting specific gravity : 1.055, Alcohol content : 5,5 %.
The latest addition in our range: A thirstquenching pale amber beer with a refined bitterness and a soft finish, a worthy alternative to the commercial Belgian ales.

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JULY-AUGUST 2004
Volume 10 Number 4

Brew Your Own

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by John Palmer
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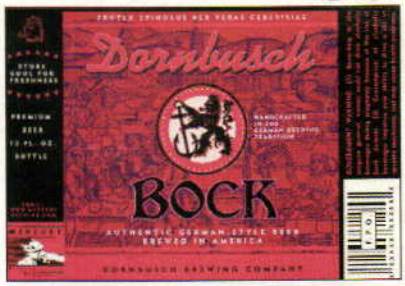

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We Gave You Amber. . .

They Gave Us Silver.

You Be The Judge.

Silver Medallion Winner, Great American Beer Festival.

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BYO RECIPE STANDARDIZATION

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

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

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

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

Contributors

Greg Noonan is the author of several homebrewing books, including "Scotch Ale" (1993, Brewers Publications), the 8th book in the Classic Beer Style Series. He also wrote "New Brewing Lager Beer" (1996, Brewers Publications) and co-authored "The Seven Barrel Brewery Brewer's Handbook" (G.W. Kent, 1997), along with Mikel Redman and Scott Russell. He's also written for *Brew Your Own* and serves on our review board.

Of course, Greg doesn't just write about beer — he also brews it. Noonan began homebrewing back in 1977, when very little information about small-scale brewing was available. He is now is the owner and brewmaster of the Vermont Pub & Brewery, a 14-barrel brewpub in Burlington, Vermont — not too far from *Brew Your Own's* home office in Manchester Center, Vermont. The brewery — opened in 1988 after three years of wrangling with the Vermont legislature to allow for on-premise brewing — has won GABF medals for its Auld Tartan Wee Heavy and Vermont Smoked Porter. On page 14 of this issue, Tips from the Pros columnist Tom Miller gets Noonan to discuss his techniques for making a fruit beer.

Bill Pierce encountered his first homebrew in the early 1970s when college friends offered him a sample of their initial batch. "I believe your horse has diabetes," was his reaction. He expressed a vague interest in homebrewing on several occasions, but it wasn't until another friend received an extract brown ale kit as a birthday present in 1994 that he actually tried his hand at it. "The beer was surprisingly good," he says. "I was hooked."

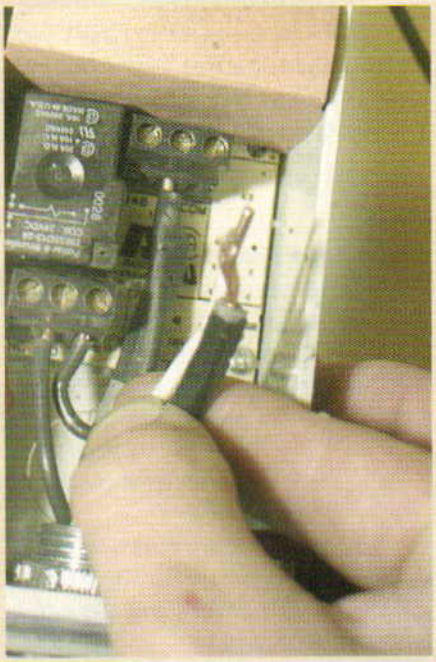
The effort led to an abiding passion for brewing that has continued ever since. In 1999, he left his job to complete the Craft Brewer's Certification Program at the Siebel Institute of Technology in Chicago, followed by a brief stint as a brewpub brewer. "Professional craft brewing was a real eye-opener," he says of the experience. "It's a true labor of love for most of those who do it."

While his academic background is primarily in English, he did have an undergraduate minor in chemistry. His various careers also have included college teaching, newspaper writing and computer consulting.

Bill has recently married and moved to Burlington, Ontario. He is a Certified judge and active in the Beer Judge Certification Program. He also helps moderate the Internet Brews & Views forum sponsored by the online Home Brew Digest. "My wife has awakened my curiosity and respect for Belgian styles," he says. "You could spend a lifetime brewing them without duplicating the rich complexity and diversity of that amazing small country."

Of brewing, Bill says, "It's a wonderful combination of art and science. I think it's impossible to do it well without an appreciation and understanding of both." As the columnist for our new department, Advanced Homebrewing, Bill will explain both the artistry and technology behind various topics to advanced homebrewers. His first installment, found on page 49, is on decoction mashing.

Controller Correction



Several readers discovered errors in our last Projects column, "Lager Climate Control" (May-June 2004 BYO). Most important is a possible problem with the wiring. If you built the controller with the GFCI, the GFCI may not function properly. Those built with a duplex outlet would function, although it should be rewired correctly. Although the Ranco unit is well-insulated, there is a potential for an electric shock if the user somehow comes in contact with the circuits inside the box.

First, correcting the incorrect descriptions: As a general rule, the common (neutral) wire is white and the power-carrying wire (the hot wire) is black. As a general rule, the black (hot) wire should be switched, not the white (neutral) wire. Another general rule when connecting wires to outlets is to connect black to bronze and white to silver (although two electricians we spoke to said that this is a general rule of thumb, not an absolute).

Required wiring changes

The required changes for the project are very simple. Obviously, you should unplug the unit before proceeding.

1.) Switch the black and white wires from the outlet (duplex or GFCI).

In our example, the ribbed wire marked with black tape (the neutral wire) is correctly wired to the COM wiring block (on the upper right of the device). Separate the black wire (it comes from the outlet) from the ribbed (neutral) wire.

2.) Unscrew the NO terminal (at the lower left of the device), releasing the white (neutral) wire.

3.) Insert the black (hot) wire into the NO terminal.

4.) Join the white (neutral) wire to the ribbed, marked (neutral) wire and insert into the COM terminal.

5.) The jumper - "120" on the upper terminal bock to "C" terminal on the lower block - remains unchanged.

The corrected wiring is shown in the photograph to the left. BYO apologizes for the error and thanks all the readers who wrote in to inform us of the problem.

Smoke on the Water?

Your most recent issue contained an article about smoking malts on a grill ("Barbecued Beer?" May-June 2004). I am a dedicated smoke beer lover and am currently planning on purchasing an actual smoker for the purposes of smoking my malt. In doing my research, I have run across a beastie known as a "water smoker," which produces steam in addition to the smoke, and therefore continually "bastes" the malt with water. The manufacturers claim that this steaming process will infuse the malt more deeply into whatever is being smoked. Will that also be true for malt? If so, is this sort of "deeper smoke infusion" desirable in smoked malt? Finally, as an extract brewer who steeps specialty grains, what is the best way to utilize my smoked malt?

Mike Hanks
Springfield, Virginia

Author, and BYO editor, Chris Colby responds: "Some homebrewers — including Corey Martin, whose smoked porter recipe was included in the article — put a pan of water in the bottom of their grill when they smoke their malt and you can get good results using either dry or 'wet' smoking. If you try it both ways, you can taste the malt (or brew with it) and tell which way you like better. I don't think it will make a terrific amount of difference, but have never tried smoking with a water pan.

"Remember that you need to dry the grains, however, so you should remove the water for the last part of your smoking session (or time it so all the water has evaporated by then).

"As an extract brewer, you should smoke only specialty malts, not base malts such as pale, pale ale or Pilsner malt. Once the malt has been smoked, crack it and steep it as you would with any specialty grain. Some brewers let their smoked malt sit a day or two before using it and this is also an option."

Fresh What?

The May-June 2004 issue contained the winning recipes in our beer and barbecue contest. In the recipe for Jeff Reamy's Stout Marinated Ribs, a word was left out. In the ingredients for the

glaze, it reads "2 tbsp. chopped fresh." It should read "fresh parsley."

Hop Calculations

Can you please give me the equation for converting AAU to ounces or percent?

Amy Smith
via email

AAU (or alpha acid units) are equal to the weight of hops (in ounces) times the alpha acid rating of the hops — AAU = w(oz.) x alpha acids(%). If the recipe calls for X AAU of hops and your hops are rated at Y% alpha acids, you would need X divided by Y ounces of hops. For example, if the recipe specified 12 AAU of Hallertau hops and your hops were rated at 4% alpha acids, you would need (12/4 =) 3 ounces of hops.

Kettle Cleaning Tip

I saw a reply in Mr. Wizard's column, from some time ago (November 2003, *BYO*) on your web site (www.byo.com) about cleaning a burnt stainless steel kettle. The person had cleaned their kettle with a Scotch Bright pad after having burned a batch. From then on it had been progressively difficult to clean due to the rough surface.

I scorched a kettle and used an old chef's trick to clean it. I put a few gallons (11+ L) of water into the kettle, added a pound (0.45 kg) of baking soda and let it boil for a while. I removed it from the heat and scrubbed it with a sponge with a handle. If the burnt residue doesn't all break loose after the first heat, try it again. In this way, there are no course abrasives to roughen the stainless surface. I'm sure there is a change in the surface of the stainless as it hadn't ever been so bright. This cleaning method was almost effortless and didn't involve harmful chemicals. Next mishap, give it a try.

Gerald Blaski
via email

Pieces of Pounds (to Ounces)

Your recipes give the weight of ingredients in pounds, with a decimal remainder. I can figure out the easy ones, (0.5, 0.25), but how do I convert, say, 7.8 lbs. to pounds and ounces?

Marcus Ward
Meridan, Connecticut

Multiply the decimal part by 16 to yield the number of ounces. For example. 7.8 lbs. equals 7 pounds and (0.8 x 16 = 12.8), so 13 ounces. ■

brewer PROFILE

Brian Ausderau • Albuquerque, New Mexico

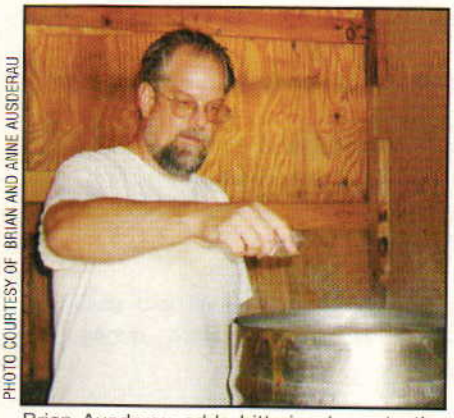


PHOTO COURTESY OF BRIAN AND ANNE AUSDERAU

Brian Ausderau adds bittering hops to the boil in one of his favorite brews.

When my husband Brian needs a beer, he doesn't go to the kitchen; he heads to our two-room horse barn. When he reaches the barn, which he's turned into his brewery, Brian will open up an old meat freezer that he converted to a beer refrigerator. He'll check the CO_2 to make sure that he has the proper dispensing pressure or adjust accordingly. Then he'll simply fill up a growler from whichever converted 5-gallon (19 L) Corny keg he happens to have chilled on the given day.

He'll close the freezer door, but not before making sure the temperature is 43 °F — the proper temperature for serving the blonde ale on tap. Brian will carry the beer back to the house where it will have to sit in the kitchen refrigerator until the foam subsides. In about ten minutes (OK, sometimes sooner if he just can't wait), he will be able to enjoy his beer.

Brian is an all-grain brewer who has been creating his own craft beers for twenty years. He started with extract kits and over time developed his all-grain system. After brewing in our last house's garage, he enjoys spending time in our new house's barn. What used to be a simple horse shed is now a brewery consisting of two converted kegs and a picnic cooler that sits on a 1960s metal office table.

The other room houses his back issues of beer magazines, books and printed articles from the internet. It also holds his carboys, hoses, bottle capper, grain mill, wort chiller, two chest freezers, a copper false bottom for the mash tun and extra bottles for when he has to enter a competition or give some beer away. Brian is also good at tossing his spent grains into the compost pile and aiming excess water at the roses and hops.

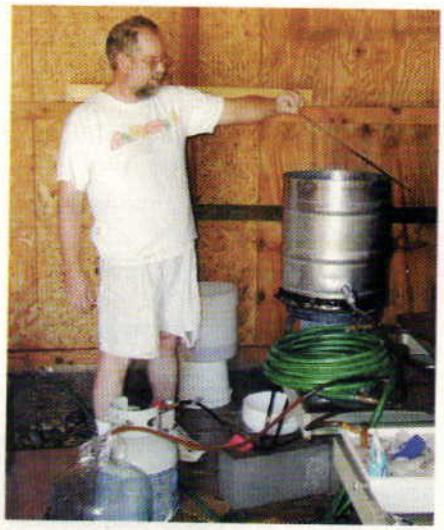
In 1994, Brian joined the Dukes of Ale, a local homebrew club in Albuquerque and has since been president twice. He is still an active participant in the club and will once again be in charge of the judges for the New Mexico state fair. He is a BJCP certified judge and has won numerous awards. His award-winning brews include a triple decoction doppelbock, German pilsner, raspberry wheat, hefeweizen, mango weizen, English pale ale, stout and porter.

Most recently, Brian won Blue Corn Café and Brewery's Lucky Dog Homebrew Contest. The inspiration for his Platinum Blonde came from a recipe he found on the *BYO* Website. The Lucky Dog brews his winning recipe with the brewmaster on the brewpub's system. It's really cool for the homebrewer to watch his 10-gallon recipe be turned into seven barrels (217 gallons/821 L). The homebrewer's name appears on the menu until the last glass of his beer has been poured and gets to keep a keg of his fresh brew for his effort.

That's quite an accomplishment for a guy who just wanted good, fresh beer at a cheap price over twenty years ago. All of this just goes to shows that if you are interested enough and you're willing to learn, you can achieve the ultimate reward — never running out of beer!

-Anne Ausderau

After checking the dispense pressure and temperature of his current beer selection, Brian can fill a perfect pint or growler.



Above: Brian sneeking a peek of the finished wort during chilling.
Left: Shown here is the Ausderau horse barn where Brian makes and stores his beer.

beer BASICS

BREWER'S DICTIONARY

M is for . . .

malt: barley or other grain steeped in water and germinated to create enzymes to be used in mashing, then kilned to stop the growth of the grain and to reduce moisture

maltase: the enzyme that catalyzes the reaction that coverts maltose into dextrose

malt extract: wort concentrated into a syrup or powder by removing all or most of the water

mash: (n.) a mixture of milled malted grains and hot water used to produce the sweet wort needed in brewing. (v.) mixing ground malt with hot water in the mash tun to extract the malt starch and convert it to grain starches and fermentable sugars

mash kettle: the kettle used to boil part of the mash in decoction brewing

mash tun: a vessel used to hold the mash in infusion brewing. May be fitted with a perforated false bottom to remove the sweet wort produced during mashing from spent grains.

mead: a beverage produced by fermenting honey

melomel: mead flavored with fruit

metheglin: mead flavored with spices

milk of amnesia: a term for old ale, a strong, dark draft beer with a high original gravity served in Britain.

milling: grinding the malt into grist before extracting sugars during mashing

modification: the net physical changes that occur within the barley kernel as it is converted from barley to malt

homebrew UNIT

Special Forces

Fort Carson, Colorado

Most homebrewers will tell you that busy schedules often rob them of sufficient time with their brews. But even strict military schedules and frequent deployments couldn't stop the 10th Special Forces Group at Fort Carson, Colorado from conducting their third annual homebrew competition last October.

The competition, which evolved as an offshoot to the group's annual chili cook-off, included 14 partial-mash entries this year. This year the unit's family members and military peers voted on the brews, but Major George Thiebes says the group's brewers may eventually assemble a judging panel from local homebrew suppliers and microbrewery owners. Especially if the number of entries continues to increase as it has from the first year's entries. Whether from professional judges or good friends, the soldiers appreciate the feedback that their competition provides.

Rainer Steinbauer, who was born and raised in Germany, won Best In Show this year for his clone (see recipe) and Thiebes won Most Exotic for his double chocolate coffee stout.

Although the 10 or so homebrewers currently assigned to Fort Carson have not formed a brew club, they do exchange brews and recipes occasionally. The unit appreciates the yearly competition as a way to relieve stress (even when the bottles of over-carbonated raspberry wheat beer decide to blow).

When deployment diverts these suds-slinging soldiers from their brewing endeavors they are sure to set aside any extra time during their travels to sample beer from the diverse places they visit.

Guests and judges taste some brew during the third annual homebrew competition.

reader RECIPE:

Steinbauer's Best of Show

(5 gallons/19 L, extract only)
OG = 1.044–1.048 FG = 1.011–1.012
ABV = 4.3–4.6%

Ingredients
4.0 lbs. (1.8 kg) Edme liquid wheat extract
2.0 lbs. (0.9 kg) Muntons wheat dry malt extract
1 tbsp. Hallertauer Hops
1 bottle König Ludwig Hefeweizen
1 cup corn sugar (for bottling)

Step by Step

Mix malt and hops in a stock pot with one gallon (3.8 L) water. Heat to 172 °F (78 °C) and let simmer at this temperature for approximately 20 minutes. Mix wort with 4 gallons (15 L) of water in your fermentation bucket.

Add one bottle König Ludwig hefeweizen, seal and let ferment. Once the interval between the bubbles is two minutes or more, it should be ready to bottle. Mix the corn sugar with the water and boil for five minutes. Pour corn sugar mix into your bottling bucket and siphon in your beer. Let the beer sit for approximately five minutes and proceed to bottle. After approximately two weeks it is ready to enjoy!

replicator

by **Steve Bader**

Dear Replicator,

Our favorite ale is Flying Fish's seasonal Farmhouse Summer Ale. We enjoy this beer all summer long at our local pubs and are sad to see that it is out of season. We've tried a number of Belgian white ale recipes, but can't seem to replicate the crisp and refreshing aroma and taste of this brew. Can you help?

Gene and Sharon Zak
Sewell, New Jersey

I spoke to head brewer Jonathan Zangwill at Flying Fish about this seasonal beer. Jonathan describes Farmhouse Summer ale as a beer that does not fit into a traditionally recognized beer style. It is light in color with low hop bitterness. Jonathan says "what makes this beer so delicious is its crisp, slightly sour and citrusy finish. The beer drinks so easy on hot days, you don't even realize you are drinking beer."

The crisp, slightly sour flavor comes from a "sour mash" with a small portion of the grain used to make this beer. If this malt gets so stinky you could never imagine putting it anywhere but the trash can, it's perfect! For more information visit www.flyingfish.com or call 856-489-0061.

Flying Fish Brewery – Farmhouse Summer Ale

(5 gallon/19 L, extract with grains)
OG = 1.045–1.048 FG = 1.010–1.011
IBU = 18 SRM = 3+ ABV = 4.3–4.6%

Ingredients

3.3 lbs. (1.5 kg) Coopers light malt extract syrup
2.2 lbs. (1.0 kg) Briess wheat dry malt extract
0.5 lbs. (0.2 kg) wheat malt
3 oz. (85 g) Carapils (dextrin) malt
3 oz. (85 g) pale 2-row malt (for sour mash)
1.0 AAU Styrian Golding hops (0.25 oz./7g of 4.0% alpha acid)
3.5 AAU Magnum (0.25 oz./1.8 g of 14.0% alpha acid)
2.1 AAU Styrian Golding hops (0.53 oz./15 g of 4.0% alpha acid)
1.4 AAU Styrian Golding hops (0.35 oz./10 g of 4.0% alpha acid)
White Labs WLP005 (British Ale) or Wyeast 1098 (British Ale) yeast
0.75 cup of corn sugar (for priming)

Step by Step

For the sour mash, start 2–3 days in advance. Steep 3 oz. (85 g) 2-row pale malt in a pint of 150 °F (66 °C) water, then cover and let sit for 2–3 days. On brew day, steep the sour mash along with the wheat and dextrin malt grains in 3 gallons (11.4 L) of water at 152 °F (67 °C) for 30 mins. Remove grains from wort, add the first wort addition of Styrian Golding hops, malt syrup and dry malt extract, tnen bring to a boil. Add the Magnum hops and boil for 60 mins. Add the second addition of Styrian Golding hops for the last 30 mins. of the boil and add the last addition of Styrian Golding hops for the last 2 mins. of the boil. Now add wort to 2 gallons cool water in a sanitary fermenter and top off with cool water to 5.5 gallons (20.9 L). Cool the wort to 75 °F (24 °C), aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68 °F (20 °C) and hold at this temperature until the yeast has finished fermentation. Bottle and enjoy!

All-grain option:

This is a single infusion mash. Do the sour mash the same as above. On brew day, add 8.7 lbs. (3.9 kg) of 2 row, 0.5 lbs. (0.2 kg) wheat malt and 3 oz. (85 g) of dextrin malt to complete the grain bill. Mash grains and sour mash at 152 °F (67 °C) for 60 mins. Collect enough wort to boil for 90 mins. and have a 5.5-gallon (20.9-L) yield (about 7 gallons or 26 L). Lower the Styrian Golding hops in the 30-min. boil to 0.5 oz. (14 g) to account for higher extraction ratio of a full boil. The rest of the recipe is the same as above.

homebrew calendar

July 2
8 Seconds of Froth
Cheyenne, Wyoming
The High Plains Drafters will be hosting their 10th annual 8 seconds of Froth competition on July 10 at Sanford's Grub & Pub in Cheyenne. Entries are $5 per entry and are due July 2nd. For participating homebrew supply stores in the Denver/Boulder area contact Steven Riegel by phone at 307-638-2118 or via email at steve_and_trina@hotmail.com. Visit www.vcn.com/~bbriggs/drafters.html for more info.

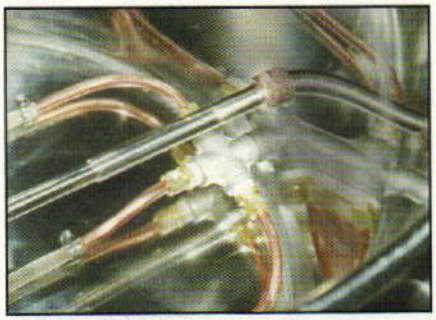
July 14
E.T. Barnette Homebrew Competition
Fox, Alaska
The entry deadline for the E.T. Barnette Homebrew Competition is July 14. The cost is $5.00 per entry (three 12–16 oz. bottles per entry). Entries must be sent via Federal Express or UPS to Silver Gulch Brewing and Bottling Company, 2195 Old Steese Highway, Fox, Alaska 99712. For further information and to download entry forms, visit www.mosquitonet.com/~stihlerunits/ScottsDen/Beer/Events/Events.html. Other questions can be answered by Scott Stihler by phone at 907-452-2739 or via email at stihlerunits@mosquitonet.com.

August 13–16
Colorado State Fair Homebrew Competition
Pueblo, Colorado
Judging for this event will take place on August 21. Entries must be received between August 13–16 and shipped in care of Debbie Wallace to 1001 Beulah Avenue, Pueblo, CO 81004. The cost is $5 per entry and should consist of three bottles. For more info and entry forms visit www.coloradostatefair.com/pdf/preiumbook/special/homebrew.pdf.

homebrew SYSTEMS that make you DROOL

Al Korzonas • Homer Glen, Illinois

Top: Al's system houses two 18 ¾-gallon stainless steel kettles.
Middle: Korzonas uses this 20-gallon wooden barrel to age some of his brews.
Bottom: Here you can see a close up of the mashing system inside Al's kettle.



Planning my brewery took months, but constructing it took just three weekends. I first needed to buy the stainless steel kettles and burners so that I could build the stand to the proper dimensions. I mail ordered two 18.75-gallon kettles and two 50,000-BTU burners then built the stand around them. The stand was constructed of galvanized steel angles and flats and held together by bolts, lock washers and nuts. I did a rough sketch on paper and then made adjustments as I was building.

I extended the corner verticals above the support surface because I wanted to minimize the risk of knocking off the kettles. Given the size of the kettles, it's unlikely that I would push them off the stand, but I tend to err on the side of safety. I even extended the two side pieces of the base to add front-to-back stability. The cross bracing is extremely important for making the stand sturdy. Hacksawed galvanized edges are also extremely sharp, so I made sure to file them down and smooth them out.

The 50,000-BTU burners are fine for heating the mash and would be more than adequate for 10 gallon batches, but they are just barely enough for my 15 to 17-gallon batches. They work fine for the boil, but when it comes to heating sparge water, I would rather have more heat (from a higher BTU burner). If a brewer plans to switch to natural gas, the BTUs drop to something like 40,000, which may even be under-powered for a boil. I've seen a 90,000-BTU natural gas burner at a restaurant supply store . . .but to my dismay it cost $525!

I built the lower (kettle) stand so that I could fill a 6-gallon carboy via gravity. The upper stand was built so the bottom of the mash tun sits just above the top of the kettle. This is slightly less height difference than in my previous system, but so far (about 25 batches) I've had no problems with stuck or slow runoffs.

Next I installed the burners. I chose my burners after comparing many different brands. My burners have a built-in peizoelectric starter so they turn on with a twist of a knob. They also produce a more even heat than the "rocket engine," single-jet burners. The burners are currently jetted for propane because I'm brewing outdoors. I store the system in the basement and move it outdoors when it's time to brew. Once I move the brewery to its permanent indoor space (with an exhaust hood and forced makeup air), I'll re-jet the burners for natural gas.

Al stores this system in the basement and brews outdoors — for now. He plans on moving his brewery inside permanently.

we want you

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

Send us your story!

If we publish your article, recipe, photos, club news or tip in Homebrew Nation, you'll get a *BYO* Euro sticker.

Fruit Beers

Two pros agree, frozen puree is the key

by Thomas J. Miller

Do you like strawberries in your margaritas? Olives in your martinis? Then you should love the idea of fruit in your beers! From fruit flavor to fruit concentrate, fruit puree to whole fruit, using fruit in beer opens your homebrewing world to a litany of new possibilities.

Brewer: Mark Anievas is the head brewer at BJ's Pizza and Brewery in Boulder, Colorado. He is a 1994 graduate of the American Brewers Guild.

My first preference when brewing fruit beers is to use a puree. Frozen purees are easiest to keep fresh. However, when I made the Magnolia's Peach, for which we won a gold medal at the 2002 Great American Beer Festival (GABF), I didn't have the option. I couldn't get the peach or apricot in a pureed form. The second best option was to order a concentrate.

The problem with the concentrate, however, was that it came via UPS ground. I noticed right away that it said on the package to keep the product refrigerated. It ended up that the extract had either soured a little or began to ferment. I would describe the situation as one where the fruit had turned, but not to the point where it was offensive. I decided to brew with the concentrate anyway. It ended up being a good decision. Some of our customers really went nuts over the beer so we went ahead and entered it in the GABF.

The turning of the concentrate is a perfect example of bad luck turned good. Homebrewers may achieve the same thing by letting their fruit concentrate sit for two or three days at room temperature. As a result of the concentrate situation, Magnolia's Peach became a soured fruit beer. The base was a hefeweizen that I had split into two batches. One batch was fermented as a hefeweizen. The other (for the peach beer) was fermented with regular ale yeast.

In preparing the grist bill for a 10-barrel (310 gallon/1,200 L) batch, I used 300 lbs. (136 kg) of wheat malt, 200 lbs. (91 kg) of barley, and 50 lbs. (23 kg) of Munich malt to give it a little color. The ale yeast for the fruit beer was the standard Wyeast 1056. White Labs WLP001 could also be used.

The hopping schedule was light. I wanted the fruit to really shine through, so to have the hops dominate in any way would have been counterproductive. I targeted 20 IBUs and suggest cutting beyond that amount.

I added 6 gallons (23 L) of peach concentrate and 6 gallons (23 L) of apricot concentrate to the secondary fermenter. I think it is important to use an apricot-peach mix in a "peach" beer because, by itself, peach really isn't a strong enough flavor. Apricot adds a lot to the fruit flavor and drinkers will recognize the apricot as peach.

Brewers who choose to use whole fruit might want to consider adding pectic enzyme to the beer. Basically, pectic enzyme destroys the protective colloidal properties of pectins, which would otherwise result in cloudiness. Fruit like peaches and apricots are examples of fruits that are particularly high in pectins. A rate of about three drops per gallon should do the trick. Add the concentrate to the secondary. The beer from the primary fermenter is then transferred on top of the concentrate. This allows for good mixing of the beer and concentrate while the suspended yeast ensures a good secondary fermentation. After secondary fermentation is complete, it is important to transfer off the pulp. Make sure to leave as much pulp as possible behind in the secondary. Otherwise your finished beer will be like a pulp milkshake. My preference is to cap the beer as secondary fermentation nears its end. This allows for natural carbonation, which makes for a clean and effervescent brew.

The hopping schedule was light. I wanted the fruit to really shine through, so to have the hops dominate in any way would have been counterproductive.

A final word on fruit beer — some brewers want to make something like a cherry porter, where the fruit flavor combines with the sharp flavor of the malt. I went the other way, where I basically let the malt and hops get out of the way of the fruit. I suggest homebrewers try both methods and find what they like best — after all, the fun is always in the brewing!

Brewer: Greg Noonan is the owner of Vermont Pub and Brewery in Burlington, Vermont. He has written three books on brewing and is on *Brew Your Own*'s editorial review board.

The fruit beer we make at Vermont Pub and Brewery is not a fruit-accented beer. We use whole fruit and lots of it — amounting to more than one pound of raspberries per gallon (0.11 kg/L) of beer. This means that the raspberries have a major flavor impact on the beer. The beer is far sweeter than regular beer and requires significant balance.

We use macerated fruit and prefer the frozen puree. Homebrewers can use a food processor to puree fresh fruit or can look into using frozen, pureed fruit like us.

As mentioned, because we brew such a strongly flavored fruit beer, we strive to get a good balance in the finished brew. The first thing we do to help this is raise the acidity. Homebrewers can raise acidity with lactic acid. Standard lactic acid comes in a concentration of 85-88%. If you have this, you will only need to add a couple drops in a five-gallon (19-L) batch. If you have a 10% solution, you will need no more than one fluid ounce (30 mL) at most. The second thing we do is age the beer on oak chips. Brewers who make fruit beers (as opposed to fruit-accented beers) can benefit from certain winemaking techniques that make sense in perfecting the brew. The oak chips impart flavor and tannins on the beer, which balance the fruit sweetness. In particular, the tannins offer dryness. Because of the tannins, less hop bitterness is needed to offset the malt and fruit sweetness. We add very few hops in our fruit beers and even then, only to the kettle. We don't use any flavor or aroma hops.

Fermentation temperatures can be determined at the brewer's discretion. We choose a middle-of-the-road path that conveys some esters to the beer, but not substantially. Generically, I would suggest that homebrewers ferment ales starting in the high 60s Fahrenheit (~20 °C) and then let the temperature rise into the low 70s (~23 °C). Lower temperatures will cause an ale yeast to impart less fermentation flavors to the finished beer.

We add the fruit directly to the primary fermenter and have never had a problem with contamination. I know this is a concern among homebrewers but it has not occurred in our experience. A frozen puree makes it a safer bet as it is less likely to become contaminated in storage and transport. ■

Clearing Chloramine

Historical hopping, carb consideration and more

"Help Me, Mr. Wizard"

Chloramine in city water

I recently moved to a city that uses chloramine in the water supply. Looking for suggestions in removing these chloramines from my brewing water, I posted a question to an online brewing board. It was suggested that adding sodium metabisulfite to the water would clear the beer of this compound. Is this true? How does it work and what would be an approximate amount to add per gallon?

Alistair Scriven
Portland, Oregon

This is an interesting question and I did some digging to come up with a good answer for you. Dechlorination is important to brewers for flavor reasons. Compounds called chlorophenols are formed when beer interacts with chlorine and these compounds have a fairy unpleasant aroma. Dechlorination is also important to municipal water authorities in the event that chlorinated water needs to be discharged into the environment.

Although many reducing agents can be used to dechlorinate water, the ones that are most accessible to homebrewers are sodium metabisulfite or its cousin, potassium metabisulfite (commonly found in the Campden tablets used by winemakers). These compounds will remove chlorine from both sodium hypochlorite (bleach) and chloramine treated waters. The reaction converts chlorine into chloride and the sulfite is converted to sulfate. Chloride has no affect on aroma, is found in most water and is added by many brewers in the form of calcium chloride. Likewise, sulfate is a normal constituent of water and is added in the form of calcium sulfate by brewers. When this reaction occurs with chloramines, there are also ammonium ions released into the water. Again, this is no big deal because ammonium ions are found in a brewers mash and come from the malt. Keep in mind, we are talking about very low concentrations of all of these reaction products due to the low concentrations of chlorine and metabisulfite involved in the reaction.

Although chlorinated water has a strong and easily identifiable aroma, the concentration of free chlorine is usually less than two parts per million. The dechlorination reaction requires 1.47 mg of sodium metabisulfite to reduce 1 mg of free chlorine. In practice, this ratio is increased two–three fold. In easy to use terms, a ½-ounce Campden tablet can be used to dechlorinate 20 gallons of water. This reaction occurs very rapidly and all you really need to do is dissolve the metabisulfite in your water, let it sit for a minute or two and you are finished with the dechlorination process.

Many brewers boil water prior to use to drive chlorine out of the water. The boiling method works very well with water chlorinated with hypochlorite, but is less effective at removing chloramine. The metabisulfite method is fast acting, easy to perform and very effective.

Hopping through history

Last spring a previous owner of our house asked me if I had seen the hops growing unabated all over the place. He said that our house used to be the local gin factory and brewery during prohibition. Last fall, my friends (two other homebrewers) and I sent about one pound of these hops straight into the brewpot. We came up with a pretty mild brown ale.

I read your article from October 2000 and it explained the mildness of the beer and answered my questions about how much hops to add and when, but my big question remains: How do I find out what kind of hops these are and get the particulars about them? They've likely been growing here for about 75 years. Can you help or give any more hints about using fresh hops?

Tony Jones
via email

Hop variety identification can be done the old-fashioned way of comparing pictures of hop cones of known varieties to the unknown. Although this method is not perfect, it is widely used as a starting point. I have a book on hops printed by S.S. Steiner (a major hops supplier) that contains good photos, as well as verbal descriptions, of the cones from various hop varieties. Another method used these days is gas chromatography. Different varieties have distinctive aroma profiles and these can be shown using gas chromatography. This method requires expensive equipment and an extensive profile library to be effective. Another modern method of hop identification involves genetics and is the only real way to tell for sure what variety an unknown sample is. These methods are out of reach to homebrewers and most commercial brewers.

As it turns out, there were not very many hop varieties commercially grown in the U.S. 75 years ago. If the hops really date back that far, you may be able to determine the variety simply by reading historical accounts of what varieties were grown in various regions of the country. Cluster was the most significant hop variety grown in the U.S. until fairly recently. Although it is nice to know what variety is growing in your backyard, the most important thing is that the aroma is pleasant and the bitterness is not coarse (if used for bittering). Using fresh, un-kilned hops is a great way to add aroma to your beer. The best time to use fresh hops is in August and September, immediately after harvest when the cones ripen. Simply pick them, remove foreign matter (such as leaves from the

plant, pieces of the vine and insects) and they are ready for use. Hops are never "washed" and commercial producers use air flow as a method to remove small, lightweight debris.

If you want to store the hops and use them in the future, you will need to dry them for storage. This can be difficult since hops do not weigh much, have a high moisture content after harvest and have a low density. This means that you need to dry a large volume to get much yield. Food dehydrators can be used for this, but due to their relatively small size are not very practical. The serious home hop grower typically makes a small hop kiln to dry their crop for storage.

Clean up with alcohol

I was wondering about alcohol as a sanitizer. Everybody talks about bleach, iodine and commercial products. What about alcohol? Can it be used for most of your sanitizing needs? It is very cheap, evaporates quickly and could be very easy to use. Am I just nuts or what?

Pete Strunk
Philadelphia, Pennsylvania

Alcohol really is a great sanitizer and the most effective concentration for use is 70%. Many brewers use rubbing alcohol (isopropyl alcohol) in a spray bottle to spray valves, small fittings and the like before use. Although rubbing alcohol is a very effective sanitizer, it is not intended for consumption and you really don't want any appreciable amount of isopropyl alcohol in beer. Rubbing alcohol is much more toxic than ethanol, the kind of alcohol we homebrewers make, but not lethal in small doses like methanol (wood alcohol).

I use isopropyl alcohol to sanitize sample devices, keg valves and bottling equipment prior to use, however I do allow the alcohol to evaporate before using these implements and I always flush beer through surfaces sanitized with alcohol before running the beer into a bottle or keg. The bottom line is that rubbing alcohol is not a food-grade sanitizer and is not used for sanitizing fermenters, transfer lines and other pieces of brewing equipment for that reason.

Ethanol is also a very effective sanitizer at the 70% (140 proof) concentration. The problem with using ethanol as a sanitizer is that it is expensive because of taxes placed upon it. Industrial grade ethanol is much cheaper than beverage ethanol because methanol is added to it to make it toxic if consumed, thereby eliminating the taxes placed on beverage ethanol. Do not use industrial grade ethanol for anything to do with brewing or cooking!

The sanitizers commonly used by brewers have some common traits. The best sanitizers have no effect on beer flavor or foam stability, are cost effective and are not toxic when used at the proper concentration. These requirements have resulted in sanitizers such as sodium hypochlorite (bleach), iodophor solutions, peroxyacetic acid, quaternary ammonium compounds (quats) and hot water or steam. Although bleach can cause off-aromas and damage stainless steel if used incorrectly, it is a great sanitizer and is safe. Iodophor can also lead to off-flavors and quats are notorious for ruining foam. However, all of the sanitizers are food grade.

You can use alcohol for a sanitizer, but if it is likely to end up in your beer, you need to use ethanol and not isopropanol. As a closing comment, homebrewers typically follow the trends used by commercial brewers. Commercial brewers would probably not use ethanol even if it were cheap as a sanitizer since it is flammable and electrical equipment (e.g. pump motors, light switches and in-line instrumentation) gets much more expensive when designed as "explosion proof" or "intrinsically safe" as required for use around flammable liquids and gases. If you want to use alcohol at home for sanitizing, go for it!

Jack and the Beano stock

I have read *BYO* articles on Beano for getting more fermentable wort. One Mr. Wizard column mentioned an experiment you conducted with Beano, but you did not comment on the flavor of the finished beer. Do you think Beano will keep the same flavor? Also will the amylase enzyme that I can get at my homebrew shop have the same affect as Beano?

Bob Perkov
Lee Center, New York

Low carbohydrate beers were called light beers prior to the introduction of Michelob Ultra. I guess some marketing genius decided that the American fascination with the Atkins diet could be used to sell a new beer specifically formulated to be low carb. Never mind the fact that Bud Light is the best selling beer in America, Anheuser Busch needed an *extremely* low carb brew.

So, in response to Michelob Ultra, Miller and Coors came to the defense of their light beers and began advertising what is clearly printed on the labels of all light beers — carbohydrate content. It was like a revelation to the sophisticated consumers who pound down light beers like bottles of Evian. "You mean to tell me that I have been drinking low carb beers all of this time? I did not know that!" Now even Bud Light is being advertised with the clever tag line "All Light Beers are Low Carb" to clear up any confusion created by their own product.

So what does any of this have to do with the question? Basically Beano is one ingredient to make a light beer and uses an enzyme similar to that used in the production of many light and low carb beers found on the market. I don't know what amylases are available at your homebrew store, but amyloglucosidase or alpha-galactosidase are the ones that act as debranching enzymes and help to increase fermentability. Alpha and beta amylase (the two most significant enzymes active in the mash) are not debranching enzymes.

In order to address the flavor question, I suggest buying the beers listed on page 39 of the May–June 2004 issue that Chris Colby used to illustrate the range of carbohydrates found in a selection of beers. Now taste the beers in order from lowest to highest with respect to carbohydrates (rinsing your

mouth with water between samples). Then taste the beers in reverse order. If I were a betting man, I would wager that the lighter beers are clearly different than the others, with Bigfoot being off the scale with its high alcohol and bitterness.

I did not comment on the flavor of my Beano experiment because I did not want to confuse my personal preferences with the facts relating to increased fermentability. The beer had a thin, watery mouthfeel and generally lacked many of the attributes I prefer in beer. As Chris Colby discussed in his article, you can increase bitterness, roastiness or acidity and add other dimensions to dry beers, but dry is dry and there is no way around it.

My personal beer preference is actually on the dry side, but not over the top. Most of the beers I brew finish between 1.8 and 2.5 °Plato (1.072–1.010), but when you get below 1.5 °Plato (1.006), the watery mouthfeel really kicks in. Draught Guinness and other dry stouts dispensed using nitrogen are exceptions to this rule because the nitrogen dispense has a significant effect on mouthfeel and adds body with the rich and creamy foam formed during dispense. In my humble opinion, you will always end up with very thin beers if carbohydrates are aggressively reduced and the "regular" and "low carb" versions will obviously be different. If you are serious about brewing these beers I would recommend making up for what you are taking away by playing with the ideas in Colby's article.

Of mash and men

My question is regarding the thermodynamics of the mash. When I have to raise the mash temperature during the saccharification rest, there is a long delay with no temperature change. Then the temperature will suddenly rise, often out of control (even with frequent stirring). I use a 40-quart Polar Ware mash tun with a false bottom and built-in thermometer on an electric stove with a trivet. My suspicion is that the conversion is an exothermic reaction and when combined with the stove heat, it's causing the mash temperature to go awry. I'd appreciate any thoughts you might have about this problem.

Mark Pasquinelli
Bellefonte, Pennsylvania

Heating the mash in a controlled manner can be frustrating and can lead to interesting theories of what is going on in a physical sense. When I first got into brewing all-grain beers, I remember having the same problems with heating the mash in a controllable manner and wondered if the reaction could be exothermic. I can assure you that there is nothing exothermic about the enzymatic conversion of starch to smaller carbohydrate molecules.

An exothermic reaction is a chemical reaction that gives off heat to the environment and usually requires some sort of cooling provision to keep it

under control. Powders produce heat when dissolved and this is one of the few examples of an exothermic reaction in the kitchen. Brewers call this "slaking heat" and it increases as the moisture content of the malt decreases. Moisture content in malt does not vary much these days, but back when the variability was greater the slaking heat was an important element in hitting the initial mash temperature. Fortunately, this has nothing to do with your problem!

The key to controlled heating of any mass is to be able to add energy during the heating step and then quickly stop adding energy when the temperature inside the vessel hits the target. Stirring is an important part of this equation as it helps to minimize differences in temperature throughout the vessel and increases the overall heat transfer coefficient (a term used to quantify the transfer rate of energy) between the vessel surface and the stuff being heated.

You have a screen in the bottom of your mash tun used during wort collection. The false bottom has mash above it and liquid below. Even though you are stirring like mad during heating, the liquid below the screen remains below the screen (for the most part), thus making the transfer of heat from below the screen to the mash lag behind the addition of heat to the tun, much like a double boiler. What does move across the screen is energy and this flow can be measured as an increase in the mash temperature.

First, the wort beneath the false bottom starts to rise in temperature as it is closest to the heating source. If you could move this hot wort to another location in the mash, it would transfer heat from the bottom to another area. This does not happen very quickly because of the false bottom.

After some time delay, energy begins flowing from the wort under the screen and into the mash. When you hit your target temperature you turn off the heat. The temperature, however, keeps on rising due to the "double boiler effect." There is nothing exothermic going on, it is just a bit of thermal lag.

Although it is very tempting to turn an infusion mash setup into what amounts to a lauter tun with heating, the plan has the problem you describe. That is why it is best to use one vessel for mashing and another for wort separation when it comes to multi-temperature mashing.

Where I work, we have a mash mixer for mashing and a lauter tun for lautering. I know of commercial breweries that unsuccessfully attempted to combine the two vessels to save time and money. My recommendation is that you lose the false bottom from your mashing vessel and build a lauter tun if you want to continue using multi-temperature mashing. Good luck! ■

Dortmund Export

The miner and steelworker's blond lager

by Horst D. Dornbusch

Dortmund export is a blond lager that evolved in the latter part of the 19th century in the Ruhr District of Germany. The District is an oblong stretch of land, some 20 miles wide and 60 miles long. It is divided along its length by the Ruhr River, a tributary to the Rhine, from which it takes its name. To understand the Dortmund export beer, one must first understand its region of origin.

Tough brew for a tough place

From the start of the Industrial Revolution until the 1980s, the Ruhr District was the industrial heartland of Germany. Duisburg, the city with the largest inland port in Europe, was at its western edge and Dortmund, the district's largest city, fell to the east. In the land between the two cities there were dozens of towns and cities all crowded together. Rich seams of hard coal ran down to 3,000 feet (~1,000 meters) deep in the earth, some not even four feet in diameter. These residues of ancient vegetation provided the carbon for Germany's steel and the energy for Germany's industrial machine.

The Ruhr District was the crucible in which the coal from below was fused with iron ore that was hauled in by freighters, barges and trains from all corners of the globe. The District had hundreds of coal pits and steel factories. This marriage between coal and iron spawned a giant megalopolis of mines, mills and manufacturing. It was the heart and soul of the so-called German economic miracle that pulled the country out of the rubble and poverty left behind by World War II.

DORTMUND EXPORT by the numbers

OG	1.052–1.054 (13–13.5°P)
FG	1.012–1.013 (3–3.25°P)
SRM	3–14
IBU	25
ABV	5.4–5.6%

I was born shortly after World War II about 20 miles south of the Ruhr District. While I was growing up in the 1950s and 60s, nights in the Ruhr District were never really dark. The sky was kept aglow by an omnipresent fiery hue as the blast furnaces, one after another, spewed their molten rivers into the factories around them. The air smelled burnt. If you left your laundry on the balcony overnight to dry, it would be dirty the following morning. I know, because I spent two years as a student at Ruhr University Bochum, just a 10-minute drive on the local autobahn from the beer city of Dortmund.

It ought not come as a surprise that the beer the Dortmund brewers made for their hard-working patrons was as tough and hearty as the people who drank it. When a miner got off his shift — all showered but exhausted — after eight hours of jack-hammering chunks of coal from the rock in a dark, hot and dangerous shaft, what he needed was a beer he could respect. Likewise, when the steelworker left the blast inferno, where he earned his daily bread, a place hotter than the world's hottest desert, he wanted a restorative draught. The beer the Dortmund brewers came up with was a lager as strong in maltiness as the best Bavarian brew and just a touch deeper golden in color than the best Pilsner brew. All this, matched with a good dose of satisfying, earthy bitterness makes up the lager known as Dortmund export.

There was nothing wimpy about the lager from this stark, no-nonsense region of steel, sweat and coal dust. Where the Bavarian helles excelled in straw-blond elegance, gentle hoppiness and rich maltiness; where the Bohemian Pilsner excelled in lingering, aromatic Saaz reverberations in the finish; and where the effervescent northern German Pils excelled in edgy up-front bitterness; the Dortmund export excelled in the middle. With a substantial flavor and mouthfeel, the

RECIPE

Sweat-of-the-Brow Dortmund Export

(5 gallons/19 L, all grain)
OG = 1.054 FG = 1.012
IBU = 25 SRM = 8+ ABV = 5.5%

Ingredients

8.3 lbs. (3.8 kg) Pils malt (1.5–2 °L)
1.4 lbs. (0.63 kg) Briess Munich malt (10 °L) or Weyermann Caramunich Type II malt (42-49 °L)
1.4 lbs. (0.63 kg) Briess CaraPils (1.3-1.5 °L) or Weyermann Carafoam (1.5-2.5 °L)
6.3 AAU Tettnanger, Perle or Spalter hops (bittering) (1.5 oz./43 g of 4.2% alpha acid)
0.5 oz. (14 g) Hallertauer, Perle or Spalter hops (flavor)
1.3 oz. (37 g) Saaz, Perle or Spalter (aroma)
1 teaspoon Irish moss
1 package Wyeast 2042 (Danish Lager) or White Labs WLP885 (Zurich Lager) yeast
1 cup dried malt extract or corn sugar (for priming)

Step by Step

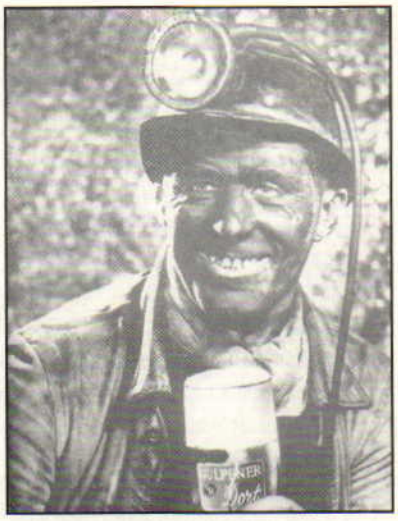
Mix the milled grains and dough in with about 2.8 gallons (10.5 L) of water for a starting mash temperature of roughly 122 °F (50 °C). Let rest for about 30 min. This step is not absolutely necessary, but it gives the grain a better chance to hydrate for improved sugar conversion at the saccharification temperature and it degrades beta-glucans (gums) for improved lautering efficiency.

If you choose a rest at 122 °F (50 °C), infuse with near-boiling water after the rest, while stirring frequently to avoid hot spots. Raise the temperature to about 152 °F (67 °C). Otherwise, mash in directly at 152 °F (67 °C), using about 4.2 gallons (16 L) of liquor. In either case, let the mash

continued on page 20

Dortmund recipes continued

continued from page 19



rest for about 45 minutes. Then infuse with hot water to reach the mash-out temperature of 170 °F (77 °C).

Recirculate until the wort runs clear and start sparging. Be sure to maintain the mash-out temperature of 170 °F (77 °C) for the duration of the sparge. Discontinue the sparge at a kettle gravity of about 1.050. After evaporation loss during the boil, the kettle gravity should be near the OG-target of 1.054.

Boil for about 90 minutes. Add the bittering hops 15 minutes into the boil. Add the flavor hops 10 minutes before shut-down. Add the aroma hops and the Irish moss at shut down. Measure the kettle gravity. Liquor down the wort if necessary. Let stand for about 30 mins. to allow the trub to settle out.

Cool to 48 °F (9 °C), pitch the yeast and aerate. In the fermenter, maintain a temperature at about 48 °F (9 °C) during primary fermentation, which may last about a week to 10 days. At this point, the brew should be at about 90% attenuation (gravity at 1.016–1.018). Rack off the debris and allow another week for secondary fermentation.

For lagering, rack the brew again and keep it at as low a temperature as your equipment allows, preferably at 28–36 °F (-2 to 2 °C). Lager for about four weeks. Rack it a final time, leaving the cold break and dead yeast behind. Add the priming agent for bottle or keg-conditioning. Package the brew. The beer is ready to drink after about two weeks. Serve it at a temperature in the mid-40s °F (5–9 °C).

Sweat-of-the-Brow Dortmund Export

(5 gallons/19 L, extract with grains)
OG = 1.049–1.054 FG = 1.011–1.012
IBU = 25 SRM = 8+ ABV = 5.0–5.5%

Ingredients

6.0 lbs. (3.5 kg) Weyermann Bavarian Pilsner liquid malt extract (usually 1.5–2 °L)
1.1 lbs. (0.5 kg) Briess Munich malt (10 °L) or Weyermann Caramunich Type II malt (42-49 °L)
1.1 lbs. (0.5 kg) Briess CaraPils (1.3-1.5 °L) or Weyermann Carafoam (1.5-2.5 °L)
6.3 AAU Tettnanger, Perle or Spalter hops (bittering) (1.5 oz./43 g of 4.2% alpha acid)
0.5 oz. (15 g) Hallertauer, Perle or Spalter hops (flavor)
1.33 oz. (37 g) Saaz, Perle or Spalter hops (aroma)
1 teaspoon Irish moss
1 package Wyeast 2042 Danish or White Labs WLP 885 Zurich
1 cup dry malt extract or corn sugar (for bottling)

Step by Step

Mill or crush the specialty grains. Pour the cracked grist into two steeping bags and immerse these in at least two gallons of cold water and raise the temperature slowly, for about an hour, until it reaches 170–190 ° F (77–88 °C). Use periodic heating to keep temperature consistent. At the target temperature, bubbles should start to appear in the liquid, but the pot must not boil! Lift the bags out of the steeping liquid and allow them to drain in a colander. You can rinse them with four cups of cold water, but do not squeeze them. Combine all flavored, colored liquid in the brew kettle and bring to a boil. Take the kettle off the heat and add the extract. Stir to distribute the extract evenly. Then fill the kettle to the standard volume and commence the 90-minute boil. Add the bittering hops 15 minutes into the boil. Add the flavor hops 10 minutes before shut-down. Add the aroma hops and the Irish moss at shut down.

Cool to 48 °F (9 °C), pitch the yeast and aerate. Maintain a temperature at about 48 °F (9 °C) during primary fermentation, which should last about ten days. Rack to secondary and let ferment for another week, then lager at 28–36 °F (-2 to 2 °C for about four weeks. Bottle or keg and condition for around two weeks. Serve in the mid-40s °F (5–9 °C).

Sweat-of-the-Brow Dortmund Export

(5 gallons/19 L, extract only)
OG = 1.049–1.054 FG = 1.011–1.012
IBU = 25 SRM = 8+ ABV = 5.0–5.5%

Ingredients

5.5 lbs. (2.5 kg) Weyermann Bavarian Pilsner liquid malt extract (75% of total extract)
1.8 lbs. (0.81 kg) Weyermann Munich Amber liquid malt extract (25% of total extract)
6.3 AAU Tettnanger, Perle or Spalter hops (bittering) (1.5 oz./43 g of 4.2% alpha acid)
0.5 oz. (15 g) Hallertauer, Perle or Spalter hops (flavor)
1.3 oz. (37 g) Saaz, Perle or Spalter hops (aroma)
1 teaspoon Irish moss
1 package Wyeast 2042 Danish or White Labs WLP 885 Zurich
1 cup dry malt extract or corn sugar (for bottling)

Step by Step

Mix the two malts with hot brewing water and bring to a boil. Follow the all-grain procedure for hopping, fermenting, lagering and priming.

Dortmund export is a solid beer for a solid breed of people. Up front, it ranked in bitterness about 5 IBU above a Munich Helles and 20 IBU below a Lower Saxon Pils. The bittering level of a Dortmund export typically was around 25 IBU. In the finish, it ranked half way between a Munich helles and a Bohemian Pilsner, with both hops and malt in a medium-dry balance. But in the middle, where the heart is, it outshone all its blond lager contemporaries, with a hefty mouthfeel and an ABV of about 5.5%.

It is obvious from this characterization of the Dortmund export that this quaffing beer of the German miners and steelworkers in the Ruhr district was quite different from the mild ale, the quaffing beer of their British counterparts in the Midlands. While the British drank a relatively low-alcohol session beer after their daily toil, the Germans preferred a heftier brew, one with more, not less, "umph" than a regular beer.

In the old days, perhaps the best Dortmund export was made by the Kronen Brauerei. The original Kronen lager dates from 1843, when Kronen brewery owner Heinrich Wenker introduced a strong Munich-style lager to his home city. By 1871, when Dortmund was rapidly industrializing, Wenker made his lager a bit stronger so that it would not spoil when shipped for "export" outside the city limits. Soon the citizens of the Ruhr District, especially the miners and steelworkers, clamored for the Kronen Dortmund Export and the name stuck.

In today's Dortmund, there are effectively only two breweries left, the Dortmunder Actien-Brauerei (DAB) with an annual output of about 3.25 million barrels and the Dortmunder Union Brauerei (DUB) with an annual output of about 1.35 million barrels. During the last decades of the 20th century, these two conglomerates absorbed virtually all other breweries in their neighborhood. The Kronen Brauerei, for instance, is now part of DAB, which markets its "world famous Dortmunder" (a quote from the packaging) under the name of "DAB Original." Other venerable pre-takeover brands included Thier and Stifts (both bought and closed by DAB), and Ritter (absorbed by DUB).

Dortmund Export: more venerated than understood

In the early Middle Ages, brewing was the exclusive privilege of clergy and nobility, a privilege, however, that was difficult to sustain after the emergence of a mercantile class at the beginning of the second millennium. The private burghers of the city of Dortmund were among the first "civilian" feudal subjects to receive the right to brew. It was conferred upon them by the King Adolf of Nassau in 1293 and they never relinquished it. By the end of the 19th century, Dortmund boasted about 150,000 inhabitants and almost 30 breweries — all making export. By World War I, Dortmund had become

the largest brew center in Europe. Even today, to the chagrin of Bavarians, Dortmund's annual beer production of roughly 4.6 million barrels is still just a tad larger than Munich's. However, the venerable Dortmund export — which put Dortmund on the beer map more than a century ago — accounts for only a small portion of this output.

The beer of choice in this erstwhile rough-neck region is now the ubiquitous Pils, the new revenue mainstay of the Dortmund brew industry. The traditional Dortmund export has all but vanished. Several of the old brands, including the Kronen, are still on the market today, but only as product lines. The most authentic Dortmund export today is made in German and North American brewpubs.

Brewing an Authentic Dortmund Export

To explain a true Dortmund export to a modern-day brewer who may never have tasted the authentic beer, perhaps the shortest and truest definition is that of a Burton-type lager. This definition is fitting mostly because both the ales of Burton-on-Trent and the lagers of Dortmund are brewed with extremely hard water, which is high in calcium and sulfate and thus produces a properly acidic mash of pH 5.2–5.4, even with pale malts. Water chemistry is devilishly complex, so the following descriptors are generalizations at best. Because hard water tends to accentuate the perception of hop bitterness, a Dortmund export can taste noticeably hoppier than its numerical IBU value would suggest.

The Bohemian Pilsner, for instance, which is made with very soft water, has a higher IBU value, but tastes less bitter upfront. Likewise, a Dortmund export is much less malt accented in the finish than a Munich helles, which is brewed with medium hard water (even though the Dortmund hop loading is only about a quarter above that of its southern relative).

Here is a simple water hardness test for dummies: If you can rinse the shampoo out of your hair easily when you take a shower, you've got hard water that is well-suited for your Dortmunder. If the rinse takes forever, you've got soft water, in which case you can add about 5–10 grams of gypsum (about 1–2 level teaspoons) to your mash or, for extract brews, to the boil, which should bring your mash pH within the target range.

Because the Dortmund export's hop loading is a compromise between Munich, Pilsen and Hamburg, it does well with a best-of-all-worlds mixture of Tettnanger for bittering (which gives a northern German Pils its zesty bitterness), Hallertauer for flavor (which gives a Munich helles its balanced hoppiness), and Saaz for aroma (which gives a Bohemian Pilsner its pronounced hop finish). Spalter or Perle hops also work well for bittering, flavor and aroma.

Because of the Dortmund export's Bavarian roots and its full-bodied middle, it is brewed with a good dose of light Munich malt and of dextrin-rich pale caramel malt — about 12.5% of each. For the former you can use the American Briess Munich malt at 10 °L or, for a deeper golden color, the imported Weyermann Caramunich Type II at 42–49 °L. For the latter you can use Briess CaraPils at 1.3–1.5 °L or Weyermann Carafoam at 1.5–2.5 °L. Because there should be almost no caramel flavor in a Dortmund export, the specialty malts are overlaid on a solid bed of Pils malt (75%). This grain bill gives the Dortmund export a deep golden color roughly between a Bohemian Pilsner and a Munich Oktoberfestbier.

Because of its crisp, medium-dry finish, always choose a clean-fermenting, low-diacetyl yeast. I make my Dortmund export with Wyeast 2042 Danish Lager, but the White Labs WLP885 Zurich Lager yeast also produces a dry finish with minimal sulfur and diacetyl.

A Note for Extract Brewers

It appears to be difficult these days to find top quality, unhopped German-style liquid malt extracts (LMEs), especially for any style other than Pilsner. Briess, Coopers, Mountmellick and Muntons each make about a handful of unhopped LMEs, mostly for ales, while Weyermann makes six year-round and two seasonal LMEs mostly for lagers. Creating any beer from extract, other than the dozen or so most common styles, usually involves blending several extracts and figuring out what do with the leftovers.

You can always preserve LME-leftovers for a few weeks in the refrigerator by covering their surface with vodka or scotch. Alternatively, you can mix them and make a second, surprise brew. If you combine the LME-leftovers from our Dortmund export, you can produce a brew that happens to resemble an Oktoberfestbier. ■

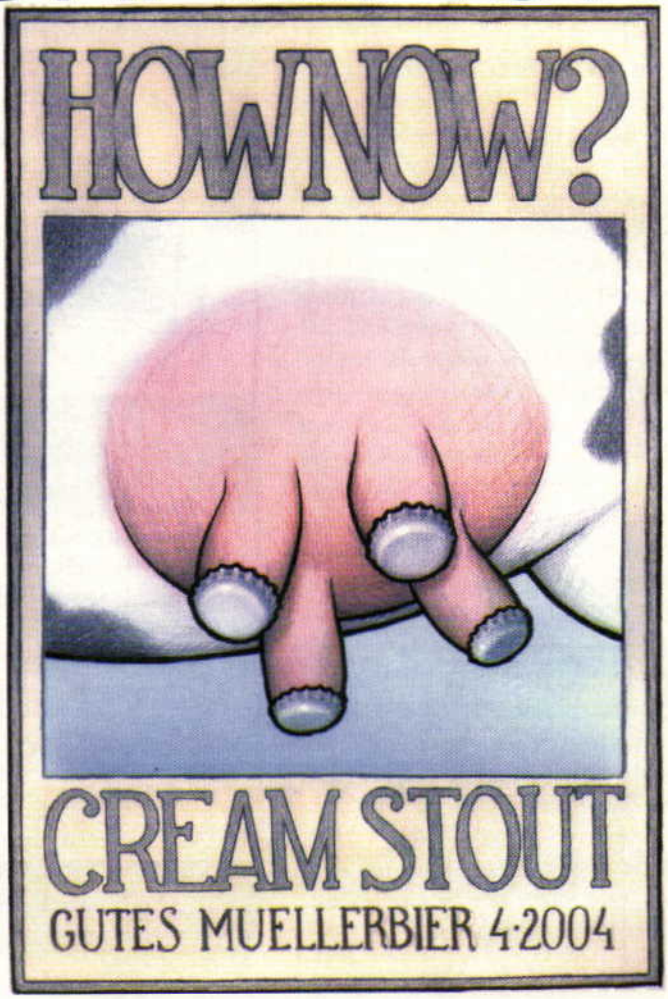
Horst Dornbusch is the author of "Prost! The Story of German Beers" (1997, Brewers Publications).

2004 LABEL CONTEST

THE ANNUAL *BYO* LABEL CONTEST is never an easy task when it comes to sitting down at the judging table. A good number of man hours is spent in fierce debate, steadfast appeal for support, an occasional filibuster and a checks and balances system so complex that our label electing democracy could never fail. When it came down to the final stretch, it was one thought that united the *BYO* staff in choosing of our Grand Champion: "Who came up with the idea for an udder-capper and where can we get one?"

Creativity is key to a contest of this nature. Joel Miller broke the mold with the innovative technique of capping the udders of a dairy cow for his Cream Stout. Our hats are off to Joel for his brave step into the milking frontier. (*Note: No animals were harmed in the designing of this label*).

GRAND CHAMPION



Joel Miller
Harrington Park, New Jersey
Prizes: 6-gallon Better-Bottle from **Bader Beer & Wine Supply, Inc.**; 6-pound bag of Gold Malt Extract and a Classic Liquor kit from **Northwestern Extract Co.**; Yeast coupons from **White Labs, Inc.**; Gift certificate from **The Brewer's Apprentice**; Party Pig set-up package from **Quoin Industrial**; Gift certificate from **Grape and Granary**

This fine piece of original artwork was drawn with pastels, colored pencils and ink. These drawing tools are a favorite of Joel's, who submitted two other original labels: "Buzzed Bunny Brown Ale" and "Half in the Bag Bass Pale Ale," which depicts the tail end of a fish with a brown bag covering the upper half of its body. Congratulations Joel!

FIRST PLACE

Phil Chesnut
Seattle, Washington
Prizes: 6-gallon Better-Bottle from **Bader Beer & Wine Supply, Inc.**; 6-pound bag of Gold Malt Extract and a Classic Liquor kit from **Northwestern Extract Co.**; Yeast coupons from **White Labs, Inc.**; Gift certificate from **Morning Glory Fermentation Supply**

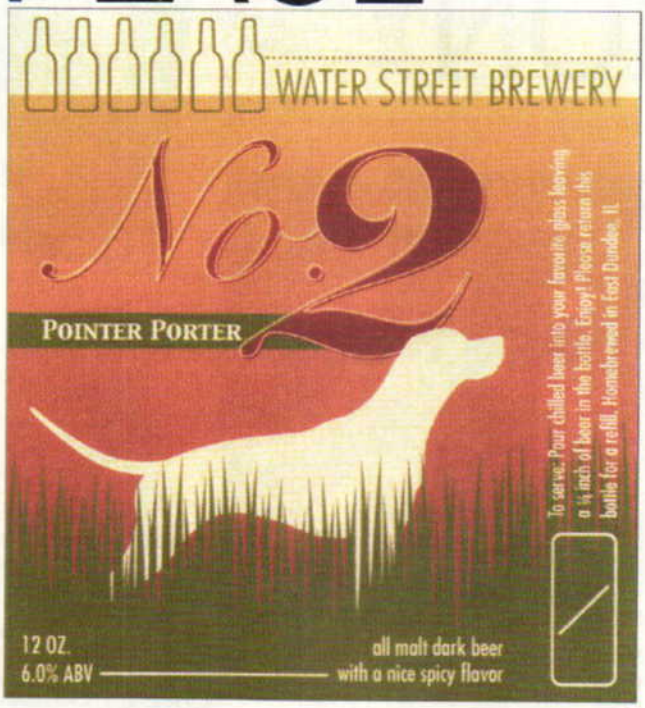
Blues music writer Phil Chestnut has been drawing his own labels in blues fashion since his first batch. In 1996 his work hit a high note when he won second place in our contest for his Muddy Water Stout. Here he displays three Kings on his Holiday Porter: Albert, B.B and Freddy King.

THIRD PLACE

Lance Saeger
Richfield, Minnesota
Prizes: 6-gallon Better-Bottle from **Bader Beer & Wine Supply, Inc.**; 6-pound bag of Gold Malt Extract and a Classic Liquor kit from **Northwestern Extract Co.**; Yeast coupons from **White Labs, Inc.**

When Lance Saeger became interested in homebrewing, he happened to be remodeling his basement. The idea of painting a bottle to look like a galvanized steel pipe and filling it with an amber ale that looked like rusty water was a winner for Saeger, who is a graphic designer by profession.

SECOND PLACE

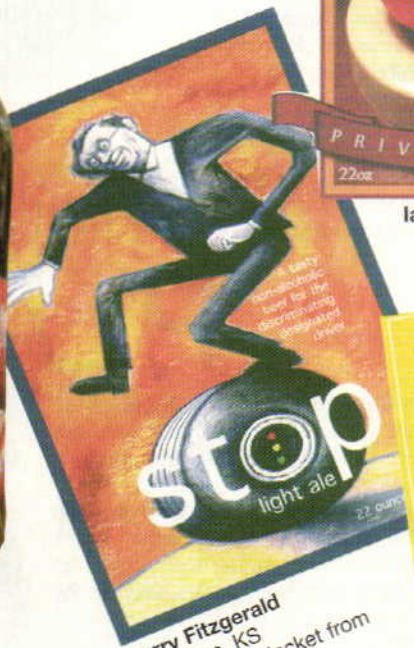


Lee Birkett
E. Dundee, Illinois
Prizes: 6-gallon Better-Bottle from **Bader Beer & Wine Supply, Inc.**; 6-pound bag of Gold Malt Extract and a Classic Liquor kit from **Northwestern Extract Co.**; Yeast coupons from **White Labs, Inc.**; Mini-tote from **Tote-A-Keg**

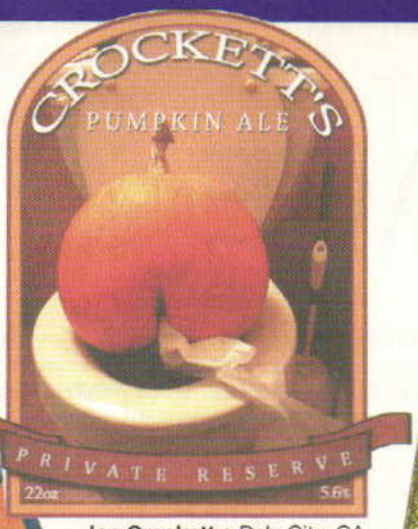
This label was one of the easier submissions to judge. After one look, the judges knew this was going to be our "No.2" label. When we caught wind that this is the label Mrs. Birkett created for Lee's second homebrew, it was a natural selection for second place. The inspiration behind the No.2 Pointer Porter was Birkett's English Pointer, a silhouette of which is the focal point of the label.

HONORABLE MENTION

Glenn Fehnel
Lancaster, PA
Prize: ProMash brewing software from **The Pumphouse**



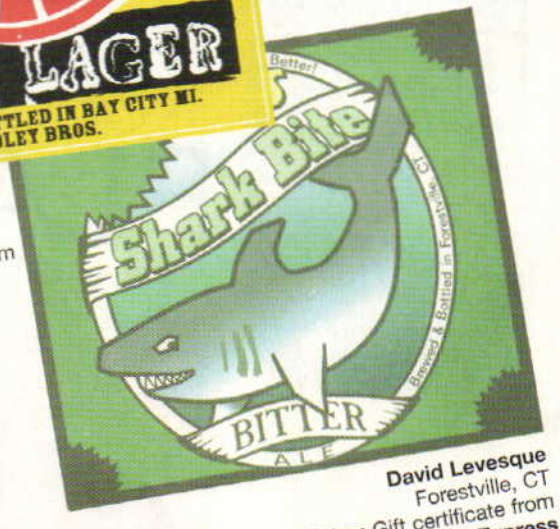
Barry Fitzgerald
Lawrence, KS
Prize: Fleece jacket from **Muntons p.l.c.**



Ian Crockett • Daly City, CA
Prize: Gift certificate from **Hop Tech**

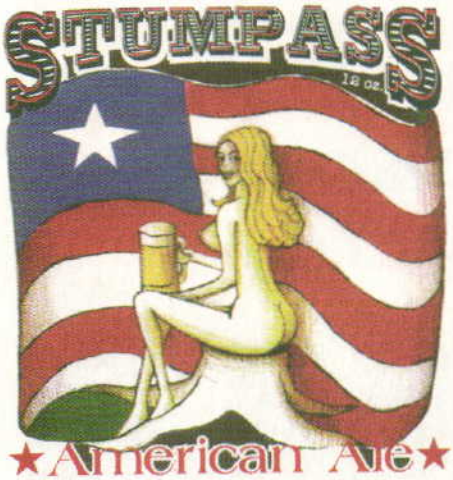
Connie & Jan Hargrove
Duluth, GA
Prize: Prize package from **All Seasons Gardening & Brewing Supply**

Chris Kro & Scott Halstead
Bay City, MI
Prize: Polo shirt from **White Labs, Inc.**

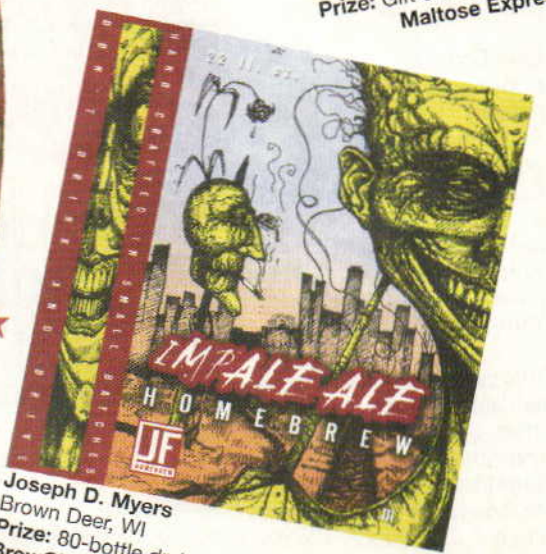


David Levesque
Forestville, CT
Prize: Gift certificate from **Maltose Express**

Jonathan Denney
Fishers, IN
Prize: Gift certificate from **Kennywood Brewing Supply**

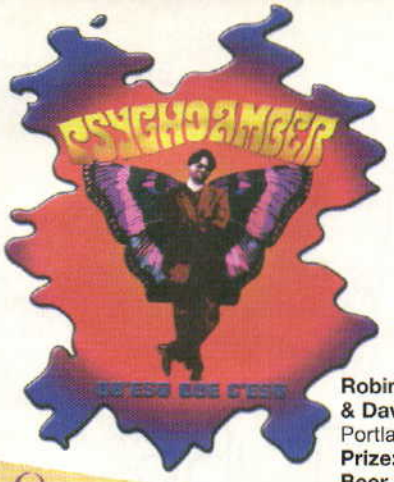


Henry McManus
Baton Rouge, LA
Prize: "Mash Tractor" mash tun from **Fermentables**

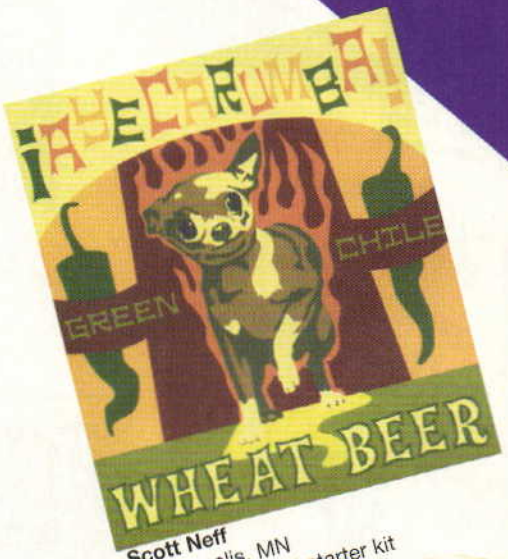


Joseph D. Myers
Brown Deer, WI
Prize: 80-bottle drying tree from **BrewCitySupplies.com**

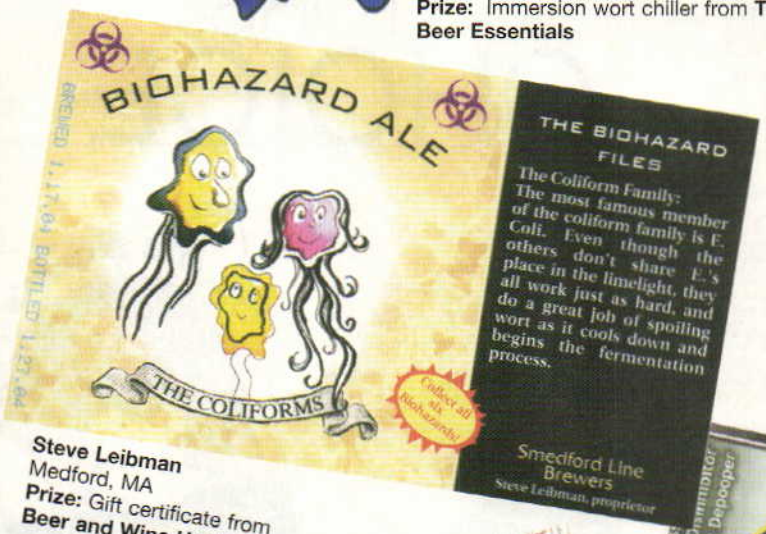
HONORABLE MENTION



Robin Catesby & David Molner
Portland, OR
Prize: Immersion wort chiller from **The Beer Essentials**

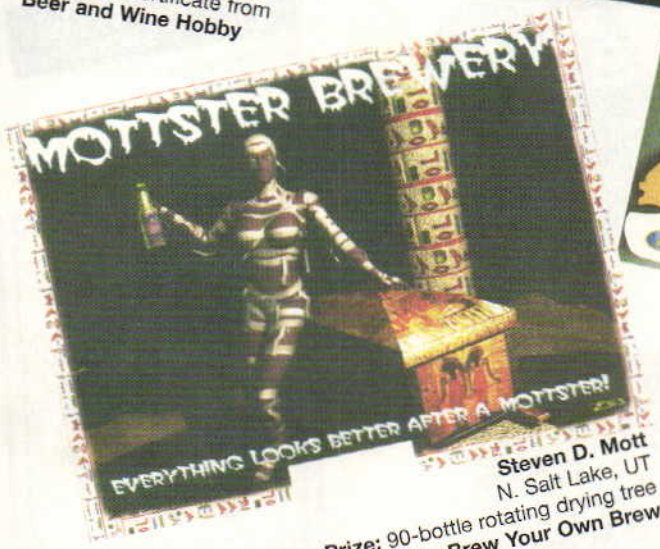


Scott Neff
Minneapolis, MN
Prize: Equipment starter kit and gift certificate for a recipe kit from **Homebrewersupply.com**



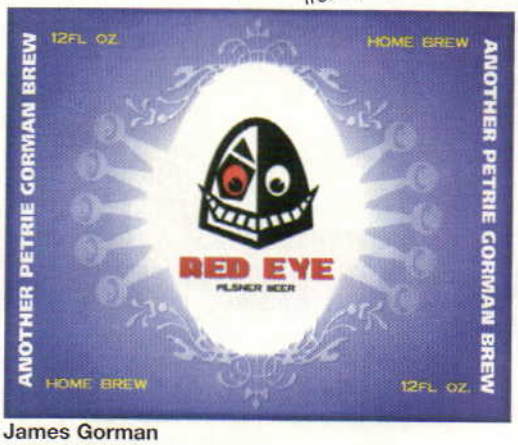
Steve Leibman
Medford, MA
Prize: Gift certificate from **Beer and Wine Hobby**

Tom Franks
Portland, OR
Prize: Alcobase kit, carbon filter system and a selection of Still Spirits flavors from **Steinbart Wholesale**

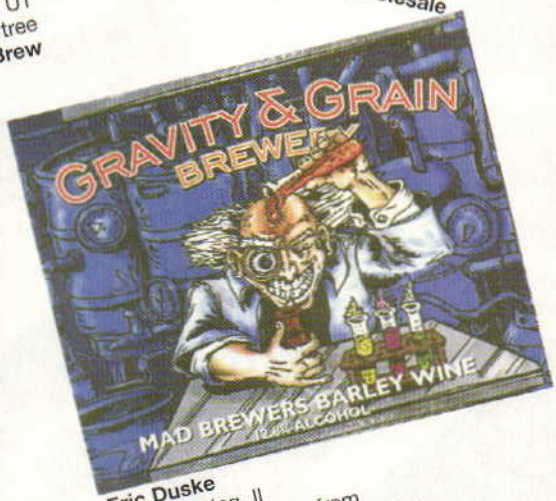


Steven D. Mott
N. Salt Lake, UT
Prize: 90-bottle rotating drying tree from **Brew Your Own Brew**

Paul Jongeward
Roseville, MN
Prize: Messenger bag from **White Labs, Inc.**

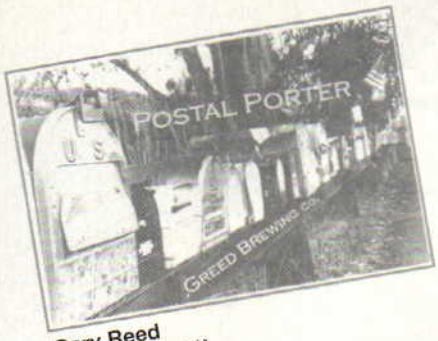


James Gorman
Lockport, NY
Prize: Fleece jacket from **Muntons p.l.c.**



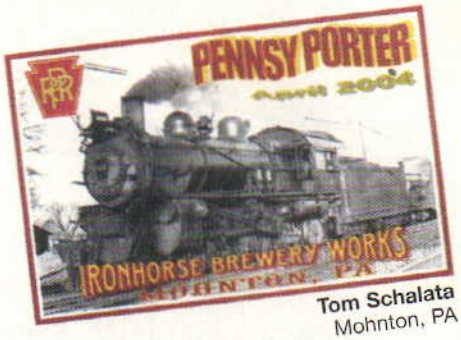
Eric Duske
Willow Spring, Il
Prize: Gift certificate from **Dave's Homebrewing Supplies**

EDITORS' CHOICE



Gary Reed
Chesapeake, VA

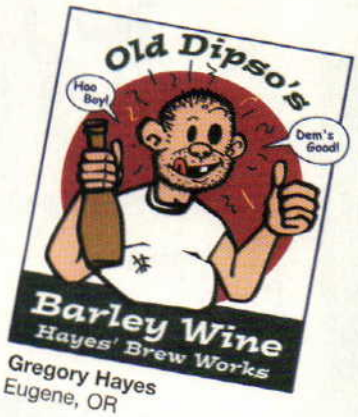
Jeff & Mike Derra
New Berlin, WI



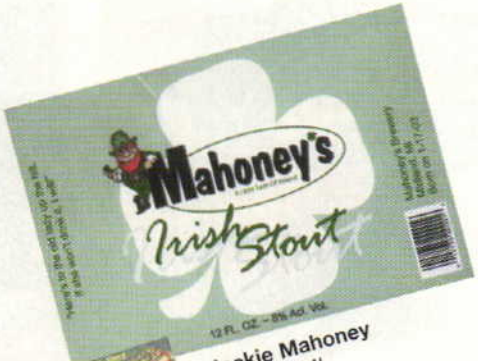
Tom Schalata
Mohnton, PA

Bob Flores
Othello, WA

Brian Shippos
Vanetten, NY

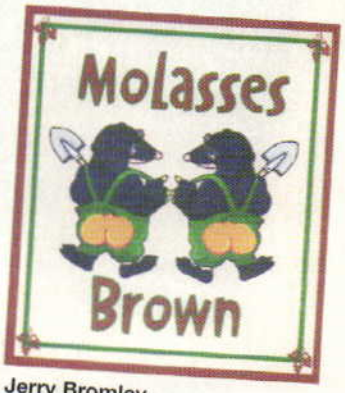


Gregory Hayes
Eugene, OR

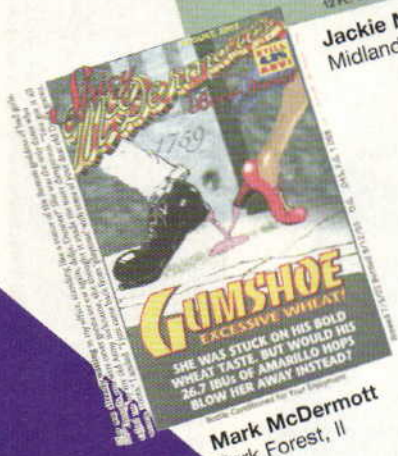


Jackie Mahoney
Midland, MI

Delvin Neugebauer
Colorado Springs, CO



Jerry Bromley
Ludington, MI



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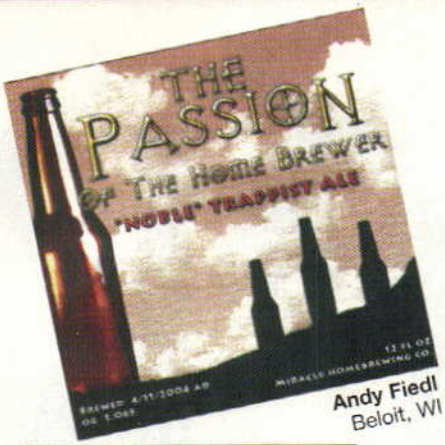

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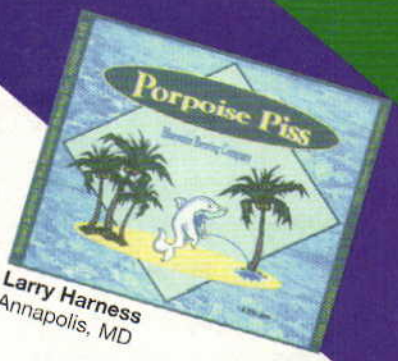

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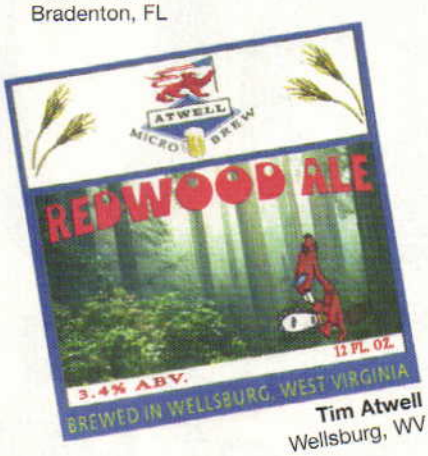

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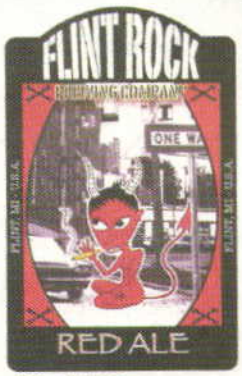

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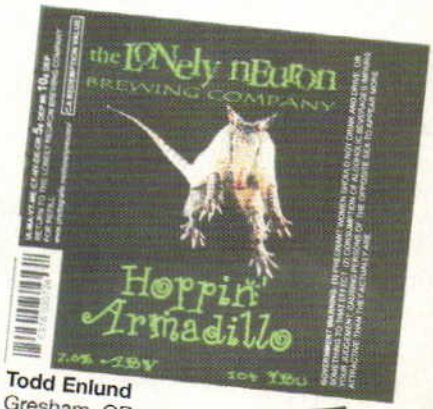

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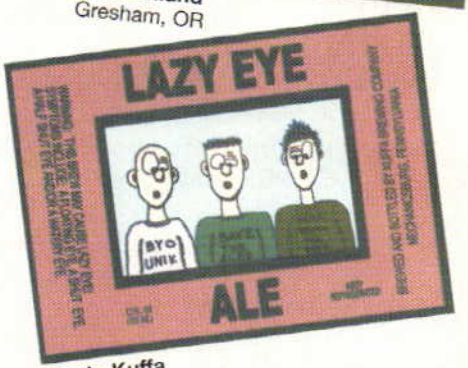

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EDITORS' CHOICE

CHIP OFF THE OLD BOCK

The AMERICAN adaptation of BOCK BEER

By Chris Colby

AMERICAN-STYLE BOCK BEERS date back to the 1800s, when they emerged in every region of the U.S. with a large German population, including Texas, Wisconsin and other places in the Upper Midwest and Pennsylvania. German trained brewers incorporated local ingredients and adapted New World brewing techniques to make beers similar to the ones from their home countries, but that were also economically viable here in the states.

Freedom from the Reinheitsgebot (Germany's Beer Purity Law), coupled with the relatively high protein content of US 6-row malts and fierce competition, likely drove most to use corn as an adjunct in their beers. For a time, this style flourished as a spring seasonal offering and most national and regional breweries offered a bock beer. As late as the 1970's, American bocks were still relatively easy to find. As a kid, I remember seeing American bock beers on the shelves and hearing the bogus explanation that it was made from beer "at the bottom of the barrel" when breweries did their "yearly cleaning." Gradually, however, consumers became less and less interested in this dark beer as American lagers gave way to light American lagers.

If some of this sounds familiar, it's likely because some aspects of the history of American bocks mirror that of American Pilsners. American Pilsners are, of course, adaptations of European Pilsners and also use corn (or rice) as an adjunct. Research by homebrewers Jeff Renner, George Fix and others reveals that American Pilsner beers used to be brewed to higher gravities and hopping rates, especially in the period leading up to and immediately following Prohibition. The homebrew beer style called classic American Pilsner (or CAP) attempts to recreate the American Pilsners of that era. As time went on, breweries lowered the gravity and the bitterness of their flagship brews to suit popular tastes, leaving us with the fizzy, yellow "Pilsners" of today.

It's tempting to argue that the formulation of American bocks changed over time. Breweries change their formulations all the time to suit popular tastes or to lower production costs. I'd say that the odds are better than good that this happened to American bocks, although I could find no specific information to confirm or deny this.

As a rendition of bock beer, I doubt American bocks were ever highly hopped. However, they may have been substantially bigger in the past. Rather than deal in speculation, however, in this article I'll deal with "recent" American bocks — the kind available through the sixties and into the seventies and for which at least one surviving example is available.

We can't taste the diversity among American bocks at the height of their popularity, but most shared a few common features. American bocks were smaller versions of their German counterparts, brewed from a lower starting gravity. Because they used corn as an adjunct, they also finished drier than German bockbiers. Sometimes, these beers were bigger than their brewery's standard Pilsner, sometimes not.

American bocks were darker than standard "American beers," with some getting their color from a small amount of dark grains in the grist and others by using malt coloring agents.

Although the vast majority of these beers are now extinct, there is one American bock that has survived — Shiner Bock, brewed by the Spoetzl Brewery in Shiner, Texas. In the 1970s, Shiner Bock was offered as a seasonal. Prior to this it had an on-again, off-again status in the brewery's lineup of brands. Beer drinkers in Austin, Texas' unique subculture — a mix of hippies and University of Texas students — adopted Shiner Bock as their own and it began to take off. Since then, Shiner Bock has been upgraded to a year-round offering and is now, by far, the brewery's leading brand. Production has gone from a few thousand barrels a year to over 300,000. Likewise, Shiner's distribution has gone from a little slice of Texas back in the 70s to 29, mostly Southern, states today. This example of the once widespread American bock style has not only survived, but is thriving.

A few other breweries have recently reintroduced bock beers into their lineup. The August Schell brewery of New Ulm, Minnesota brewed their first bock in 1860 and offered it as a seasonal for many years. Recently, they have reintroduced a bock — Schell's Caramel Bock — as a year-round offering. The brewery also hosts a yearly Bockfest. Schell's bock is, at 5.8% ABV, closer to a German bock in strength, although it is brewed with a bit of corn (6% brewers corn syrup).

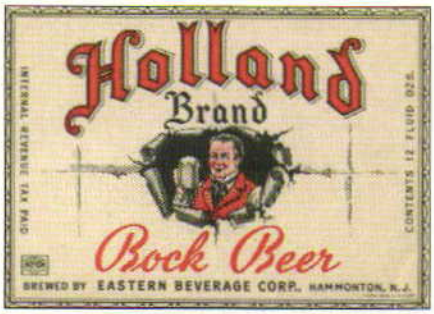
The Huber Brewery (of Monroe, Wisconsin) reintroduced Huber Bock in 1988. I don't know if it contains corn or not, but it starts at an original gravity of 10.75 °Plato (SG 1.043), in line with most American bocks. Likewise, Stevens Point Brewery (of Stevens Point, Wisconsin) reintroduced their Point Spring Bock, which they first brewed in 1938, as a seasonal beer.

Back down south, Anheuser-Busch released Ziegenbock — which the label says is brewed and available only in Texas — to compete directly with Shiner. And of course, numerous brewpubs and microbreweries make bocks, although these are mostly German-style bockbiers. On the other hand, some bock beers — such as Genesee Bock (first brewed in 1878) and Rolling Rock Bock — were recently discontinued by their breweries.

photography by CHARLES A. PARKER / IMAGES PLUS

One oddity in the American bock beer landscape is Celis Pale Bock. Originally produced by the Celis Brewery in Austin, Texas and now made by the Michigan Brewing Company in Webberville, Michigan, Celis Pale Bock is a Belgian-style pale ale that is labeled Celis Pale Ale in every state except Texas. This is sometimes attributed to Texas' crazy beer laws although it is more likely to be a marketing decision. Celis Pale Bock is only 3.9% ABV and much bigger beers are available in Texas and are still labeled as pale ales.

Shiner Bock is, arguably, the standard-bearer of this style. Inarguably, the Spoetzl brewery is much closer to me than the breweries in Minnesota, Wisconsin or Pennsylvania, so I went to



labels courtesy of www.breweriana.com

the Spoetzl to see how they brewed their American bock.

Shiner Bock is an average strength beer, not a big beer like a German bock. Its original gravity (1.044) is about the same as a standard American Pilsner. It's made with 30% corn grits and you definitely taste the corn mixed in with the malt. There is a definite dark, malty character to the beer, although — once again — it isn't as malty as its German counterparts. In this article, I'll show you how to brew a beer like Shiner, or perhaps like the American bock your father or grandfather might have drank.

While at the brewery, I spoke with Peter Koestler — the brewery engineer for Gambrinus, the company that owns the Spoetzl Brewery. Peter received his brewing education in Germany and had a four-month internship at the Paulaner Brewery, cleaning out the Salvator tanks. At the National Homebrew Conference in Dallas in 2002, he spoke on the topic of Texas bocks. Although contractually obligated not to completely spill the beans with regards to Shiner's brewing ingredients and methods, he was able to answer most of my questions.

Six-Row Malt and Corn

Shiner is brewed with U.S. 6-row malt. They get theirs from Wisconsin, but any American 6-row malt should yield acceptable results.

The Spoetzl Brewery uses around 30% corn grits in Shiner Bock and the grits are mashed using a separate cereal mash. All-grain homebrewers wishing to simplify the process can substitute flaked maize for the corn grits and skip the cereal mash.

Any homebrewer can substitute brewers corn syrup in the kettle for the corn grits, although the corn flavor in the final beer will not be as pronounced. Alternately, extract brewers can use a malt extract produced with both malted barley and corn, as many designed to make homebrewed American Pilsners or Canadian ales are. An original gravity anywhere in low 40's is what you are shooting for. (Shiner's original gravity is 11.0 °Plato, SG 1.044.)

Vienna Malt or Munich Malt

Peter couldn't tell me what other malts Shiner used, although he could say that Munich wasn't one of them. In their hospitality room, however, a jar of Vienna malt was sitting in their "what our beer is made from" display. For a homebrewer, either Munich or Vienna would work well for this style. Both of these malts lend a malty character to beer although the specific flavors they yield differ slightly. Munich malts — at 10–20 °L — are more highly kilned than Vienna, which is typically rated around 6 °L. About 33% Vienna malt or 25% Munich malt should get you the right level of flavor.

Crystal and Color Malts

Shiner Bock has a light sweetness and a color around 17 SRM. A little crystal malt (60 °L) would help out in the sweetness department and add some color. However, too much will leave too many residual sugars and the resulting beer will not be representative of these fairly dry American lagers. Keep the crystal malt under 0.75 lbs. (0.34 kg) for a 5-gallon (19-L) batch.

For color, Shiner uses a dark specialty malt from Germany and a small amount of black malt powder. Peter Koestler couldn't say the exact malt, although he could tell me my guess of Weyermann Carafa was wrong. In reality, almost any dark malt — including roasted barley, roasted malt, black patent or maybe even chocolate malt — would work as you only need to add enough for color and a faint hint of dark malt color. Less than an ounce (28 g) of black patent or roasted, or perhaps up to 1.5 ounces (43 g) of chocolate malt, should do the trick for a 5-gallon (19-L) batch.

Lightly Hopped

Walking through the Spoetzl Brewery, Peter and I came to a cold room with boxes of Brewer's Gold hops stacked to the ceiling. "Guess which hop we use?" he asked. For a Shiner clone, use Brewer's Gold, but any decent bittering hop would work in a generic American bock as you are shooting for a bitterness level below 20 IBUs. (Shiner is rated at 17 IBUs.) Cluster hops is a good choice as they were long a favorite of American breweries. It's also the hop that most CAPs are brewed with. Any German noble hop would also be a good choice.

Lager Yeast

Shiner uses a proprietary yeast strain that gives off a moderate amount of sulfur. However, for a "generic" American bock, you have several good choices. Realistically, just about any lager strain could be used, but an Octoberfest strain or White Labs Mexican Lager yeast (WLP940), should work best. There is no historical beer style that is an "ale equivalent" to American bocks. If you cannot maintain proper lager fermentation temperatures, use a lager yeast and accept some extra esters in the beer's profile.

Step and Cereal Mash

The Spoetzl brewery uses a cereal mash to handle their grits and step mashes Shiner Bock. All-grain homebrewers can choose to follow this procedure (see the first recipe) or they can use flaked maize as their adjunct and skip the cereal mash. Likewise, a single infusion mash around 148–151 °F (64–66 °C) can be used. For an Old-World touch, you could replace the 6-row malt with undermodified Pilsner

AMERICAN BOCK recipes

Flatonia Bock

(5 gallons/19 L, all-grain)

OG = 1.043 FG 1.010

IBU = 17 SRM = 16 ABV = 4.3%

The aptly-named town of Flatonia, Texas is about 20 miles north of Shiner. Like Flatonia, this recipe is "pretty close" to Shiner. This recipe is easily modifiable to make a bigger beer. Another pound (0.45 kg) of 6-row pale malt will yield an OG of 1.048. Two extra pounds (0.90 kg) of 6-row will get you to SG 1.052, about midway between Shiner and a traditional German bock. (If you add extra malt, you will need to add proportionally more water to the mash.)

Ingredients

3.0 lbs. (1.36 kg) 6-row pale malt
3.0 lbs. (1.36 kg) Vienna malt (6 °L)
2.66 lbs. (1.21 kg) corn grits
0.66 lbs. (0.29 kg) crystal malt (60 °L)
0.75 oz. (21 g) roasted barley (500 °L)
4.62 AAU Brewer's Gold hops (0.6 oz./16 g of 8% alpha acids)
1 tsp. Irish moss (15 min)
1/8 tsp yeast nutrient (15 min)
White Labs WLP940 (Mexican Lager) or Wyeast 2247 (European Lager II) yeast (4 qt./4L starter)
7/8 cup corn sugar (for priming)

Step by Step

In a large kitchen pot, mix corn grits, 5 oz. (141 g) of the 6-row malt and 3.3 qts. (3.1 L) of 159 °F (71 °C) water to make a cereal mash. Hold cereal mash at 148 °F (64 °C) for 15 minutes. While cereal mash is resting, pour the rest of the grains into your brew kettle and mash in to 140 °F (60 °C). Use about 1.66 gallons (6.3 L) of water for an initially thick mash. Heat the cereal mash to a boil, stirring constantly, and boil for 30 minutes. After boiling the cereal mash, add it to the main mash and adjust temperature with water to 152 °F (67 °C). This should bring your mash thickness into the normal range. Mash for 45 minutes, then heat mash to 165 °F (74 °C). Stir frequently, and expect the temperature to keep climbing a bit after you shut off the heat. After 5 minutes, transfer to lauter tun. Recirculate until wort is clear, then collect about 5 gallons (19 L) of wort, sparging with water sufficiently hot to keep the grain bed between 165–170 °F (74–77 °C). Add 1.5 gallons of water and boil wort for 90 minutes, adding bittering hops for final 60 minutes. Add yeast nutrient and Irish moss with 15 minutes left in the boil. Cool wort quickly to 54–65 °F (12–18 °C), aerate well and pitch yeast sediment from yeast starter. Ferment at 54 °F (12 °C) for 10–12 days, then let temperature raise to 60 °F (16 °C) for a diacetyl rest. This should take about 2 days, but taste beer before cooling. Rack beer to secondary fermenter and cool beer to 32–40 °F (0–4.4 °C). Lager for 30–45 days.

Flatonia Bock

(5 gallons/19 L, extract with grains)

OG = 1.039–1.043 FG 1.010

IBU = 17 SRM = 16 ABV = 4.3%

Follow the steeping instructions carefully to avoid extracting excess tannins or starch from the grains. (Technically, this is a partial mash, but the procedure is similar to any extract-with-grains beer.)

Ingredients

2.8 lbs. (1.3 kg) Briess light liquid malt extract
1.9 lbs. (0.9 kg) brewers corn syrup
0.25 lbs. (0.11 kg) 6-row pale malt
1.0 lbs. (0.45 kg) Munich malt (10 °L)
0.66 lbs. (0.29 kg) crystal malt (60 °L)
0.75 oz. (21 g) roasted barley (500 °L)
4.62 AAU Brewer's Gold hops (0.6 oz./16 g of 8% alpha acids)
1 tsp. Irish moss (15 min)
1/8 tsp yeast nutrient (15 min)
White Labs WLP940 Mexican Lager or Wyeast 2247 European Lager II yeast (at least 2 qt./2L starter)
7/8 cup corn sugar (for priming)

Step by Step

Begin by heating 1.75 gallons (6.6 L) of water in your brewpot and 3 quarts (2.8 L) of steeping water in a separate 6–8 qt. (~6–8 L) pot. Place crushed grains in a nylon or muslin steeping bag. When steeping water reaches 169 °F (76 °C), turn off heat and submerge the steeping bag. The temperature of the "steep" should drop to around 158 °F (70 °C). After 30 minutes, or when the temperature of the steeping water falls to 148 °F (64 °C), remove the grain bag. Do not rinse grains with water or squeeze bag. Add "grain tea" from the steeping pot to your brewpot and heat to a boil. Once boiling, shut off heat and stir in malt extract. Heat to a boil again and boil for 60 minutes, adding hops once initial foaming subsides. Add corn syrup for the last 15 minutes of boil, stirring well to avoid scorching. See the all-grain recipe for cooling and fermenting instructions.

malt and perform a decoction mash.

Using flaked maize in place of cereal-mashed corn grits will yield a somewhat different, less intense corn flavor in the final beer, but — unless you are specifically trying to clone Shiner — I don't feel this is such a big deal. Likewise, a single infusion mash will likely yield a less fermentable wort, resulting in a higher final gravity than a beer made with a step mash. However, the difference shouldn't be that great. Many homebrewers may pick the more convenient options, but — if only to try something that is likely new to you — I would encourage anyone to try the full-on cereal mash.

Fermentation

Most Shiner Bock is fermented in either "3-brew" or "5-brew" fermenters — i.e. the fermenters hold wort from either 3 or 5 wort boils. A small amount is fermented in smaller fermenters in the old part of the brewery. Unless you want to make tons of this beer, there's no reason to follow this production detail.

Spoetzl ferments Shiner Bock for 10–12 days at 62 °F (17 °C). Once diacetyl has dropped below a certain threshold, the beer is cooled to 33 °F (0.5 °C) for lagering, which lasts for 21 days. For homebrewers, ferment in your yeast strain's recommended range for about 11 days, then let the beer warm up to around 60 °F (16 °C) for a diacetyl rest. As a beer that starts around a specific gravity of 1.040–1.045, you won't need to lager this long before it is servable; around 28–35 days should do the trick.

Packaging

Shiner is filtered and blended for consistency, although there's no reason to do this as a homebrewer. Unlike many regional beers, Shiner is brewed and packaged at working strength, not brewed as a higher gravity base beer and diluted upon kegging or bottling. You could however, easily make 5 gallons (19 L) of wort at around 1.052 and dilute it to six gallons (23 L) at around 1.044 when you package the beer. In the past, many American bocks were assuredly made this way.

If you keg your beer, shoot for 2.5–2.6 volumes of CO_2 in the final beer, enough to yield the normal, "American beer" level of carbonation. Homebrewers who bottle-condition should use about 7/8 cup of corn sugar for priming a 5-gallon (19-L) batch.

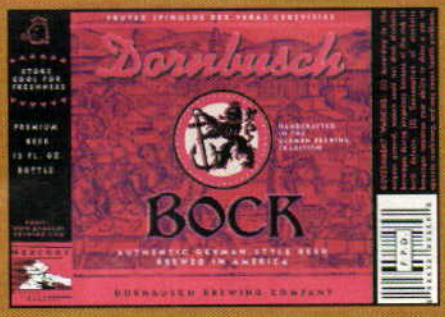
Is Bock Back?

American bock has a long history and pre-history. The original German bocks were brewed as seasonal offerings for cold-weather sipping. These days — after a century of moderate popularity followed by near-extinction — the most popular brand of American bock is a very quaffable beer that is most popular in warm-weather U.S. states. And only time will tell what changes lie ahead for this beer style. ■

Chris Colby is the editor of BYO.

BOCKbier

A Heart-Warming Brew for Bone-Chilling Times



The author's own bockbier label surrounded by two labels for Kneitinger Bock. Bockbiers, which are produced in Bavaria in different styles for every cold-weather season, are heavy, malty — yet very drinkable — lagers. Brew one this summer for fall consumption.

In the foothills of the Bavarian Alps, December to May is starkbierzeit (strong beer season). During this bone-chilling time of the year, many people abandon their quaffing beers for heftier ones, and brewers respond by turning their attention to making bockbier. However, because bockbier is a well-lagered brew, it needs at least two months from brew day to table, preferably longer. This means that there is no time to waste once the Oktoberfest oompah bands fall silent and the new malt and hops from the new harvest start rolling into the brew yard.

The beginning of bockbier-brewing also marks the beginning of the New Year for the German brewing industry. The brewers' New Year's Day falls on October 1, not January 1, because this is the most practical time for a brewery to start a new fiscal year. By that date, all the malt and hops from the previous harvest should have been turned into beer and the new harvest has been reaped. Tradition also plays a role, because, in Bavaria, between the middle of the 16th and the middle of the 19th century, brewing was outlawed during the hot days of summer, when contaminations in the brewhouse were not uncommon. Bavarian brewers simply put their mash rakes away in the spring, after first cranking out endless casks of Märzen-Oktoberfestbier, only to pick them up again in the fall to get straight on with bockbier mashing.

Was ist ein Bock?

Bockbiers rank among the heaviest and maltiest, yet smoothest, brews in the world. Like barley wines, they should be sipped, not guzzled. Traditionally, a bockbier has a minimum original specific gravity (OG) of 1.064 (16 °P) for an alcohol content of about 6.5% alcohol by volume (ABV). Most "standard" bocks do not exceed an OG of 1.072 (18 °P) and an alcohol content of 8% ABV. However, some bocks — such as the formerly Swiss Hürlimann Samichlaus Bier, now brewed by the Eggenberg Brewery of Austria — weigh in at a substantial alcohol content of 14% ABV. The strongest bockbier (and strongest commercial beer in general) is Utopia by the Boston Beer Company (Samuel Adams), with a stunning 24% ABV.

The bitterness of a bockbier is very gentle, usually within a range of 20–25 IBU, and there is next to no hop aroma in the nose or in the finish of a classic bock. Most, though not all, bockbiers are slightly dark in appearance, somewhere between dark copper and burnt amber. Depending on bockbier type, however, the color can vary by as much as a factor of 12 from the palest to the darkest versions. The range starts at a low 2.5 SRM in the bocks served in late spring and may reach a high of 30 SRM in the beers served around the winter solstice. Most, however, fall in the 15-20 SRM range.

A Bock for Each Cold Season

There are several traditional types of bockbier in Bavaria, each with its typical color and strength. It may be too sweeping a statement that the

BOCKBIER by the numbers

OG	1.064–1.072 (16–18 °P)
FG	1.012–1.016 (3–4 °P)
SRM	2.5–24
IBU	20–25
ABV	6–7%

by Horst Dornbusch

Pride Of The Bavarian Brewhouse

strength and color of Bavarian beer goes up and down cyclically with the seasons, but there is definitely a kernel of truth in this generalization. In the heat of summer, for instance, Bavarians drink their brilliantly straw-blond helles with a typical original gravity of about 1.050 (12.5 °P), an alcohol by volume (ABV) of around 5% and a color rating of 2.5–3 SRM. This is about as pale and "weak" a beer as the Bavarians will brew.

Come fall, the beer gardens give way to beer tents and beer halls as venues of conviviality and the beer gets slightly darker and stronger. Fall is the season for consuming Märzen-Oktoberfestbier, traditionally brewed in late spring or early summer to a typical original gravity of 1.054–1.060 (12.5–15 °P) and an ABV that is more often than not in the range of 5.5–6%. The brew's color value is usually 10–14 SRM.

By December, the temperature will have dipped further and the soul needs a more nourishing brew, especially after a frigid day of shopping for presents in the open-air Christmas markets that spring up in all the cities and towns of Bavaria-land around the first day of Advent. This is when the brewers must have their new bockbiers ready to serve. More often than not, these bocks have an OG in the range of 1.064–1.072 (16–18 °P). Their alcohol content is at least 6% ABV, but may be as high as 7.2%.

Weihnachtsstarkbier (Christmas bockbier) is often a darker version of the regular bock. It is also known as dunkles bock (with a color rating usually in the mid-20s to the low-30s SRM). These rewarding Yuletide brews have a slight chocolate taste from roasted caramel malts.

By February or March, with winter dragging on in Bavaria and Ash Wednesday putting a somber stop to all the merriment of Mardi Gras, it's time for some serious consolation. So, out comes the doppelbock, a beer that was first created by the Paulaner monks of Munich in the early 1700s and introduced commercially in 1780. As an escape from the rigors of the Lenten season, thousands of Munich residents gather annually in the Paulaner Beer Hall in the Nockherberg district, around St. Joseph's Day (March 19), to kick off two weeks of official bockbier drinking. The season's first cask of Paulaner Salvator Doppelbock is usually tapped there by a celebrity. Though lighter in color than the Christmas bocks, doppelbocks tend to be stronger. They are usually 18–22 SRM in color and have an original gravity of at least 1.072 (18 °P). Their alcohol content is rarely less than 7% ABV.

> Christmas bockbiers, Lenten bockbeirs and Maibocks [are] the highlights of the brewing year.

Then there is the rare eisbock, the strongest of the bockbiers. Made from a strong bockbier or doppelbock, eisbock is frozen and then separated from the water crystals that form in the tank. The result is a beer with a typical alcohol level of roughly 10% ABV. (For eisbock brewing instructions, see "Ice Block Eisbock" in the December 2003 issue of *BYO*).

By May (Mai in German), it is still too cold for a picnic in the beer garden. Still, the strength of the bockbier starts to decline from the Lenten high back to a "normal" OG of 1.064–1.072 (16–18 °P). And, seemingly in deference to the lengthening days, the beer color gets lighter, almost to a fiery blond (roughly 5–8 SRM). The bock that's being served during "the lusty month of May" — so immortalized by Lady Guinevere's little tune in Lerner and Loewe's musical "Camelot" — is appropriately called Maibock or helles (pale) bock. It is getting close to the beer garden helles in color; but in terms of strength, it is still a serious bock.

Even though bocks account for less than 1% of Bavaria's overall annual beer production of almost 23 million hectoliters (roughly 19.3 million U.S. barrels or 600 million U.S gallons), bockbiers are clearly winter's and spring's signature brews. And, Bavarian brewers across the board consider the seasonal roll-outs of their strong beers — including their Christmas bockbiers, Lenten bockbiers and Maibocks — the highlights of the brewing year.

Given the large variation in bockbier variables, I selected a "middle of the road" bock with an OG of 1.066 (16.5 °P). It usually finishes at 1.013 (3.25 °P) for an alcohol content of roughly 7% ABV. It has a color value of 18 SRM, and a typical bockbier bitterness rating of 22 IBU.

How Bock Became a Bavarian

The story of bockbier starts not in Bavaria, however, but in the northern German town of Einbeck in the middle of the 13th century. Einbeck was then an important member city of the Hanseatic League, an international trading empire comprising hundreds of powerful medieval merchants. Einbeck's specialty export within the League was a strong dark ale made from wheat and barley. Almost every inhabitant of Einbeck was directly or indirectly engaged in the brewing trade and — much to the chagrin of Munich's brewers — one of the greatest customers of Einbeck beer was the House of Wittelsbach, the ruling family of Bavaria. Eventually, the Bavarian Dukes and their entourage quaffed so much of the Einbeck ale that their drinking habits became a noticeable factor in the budget of the Bavarian State. Beer imports had become a matter of Bavarian fiscal policy.

In 1590, to salvage the Bavarian money supply from leaking north, the ruler of the day, Duke Wilhelm V, had an Einbeck-like, strong, brown to red beer brewed in his own brewhouse in Landshut (50 miles (80 km) northeast of Munich). He hoped this would recapture the market lost to the northern brewers. A year later, he completed another brewhouse for the new beer in the center of Munich, on the site of the now-famous Hofbräuhaus. Initially, Wilhelm's Einbeck beer replacement was sent only to members of the nobility; but by 1610, it was also delivered to the local innkeepers and private households. Instead of costing the crown money, beer was starting to make money for the state coffers.

Wilhelm V's successor, Duke Maximilian I, went one step further. In 1612, he enticed an Einbeck brewmaster, Elias Pichler, to come to Munich as an employee of the Wittelsbachs and brew a beer even closer to the real thing. Under Elias' guidance, and in accordance with prevailing Munich brewing practices, the famous Einbecker strong ale metamorphosed into a strong lager, the kind of bockbier we know today. The first strong Munich lager brewed the "Einbeck way" was dispensed at the Hofbräuhaus in 1614. The Bavarian dialect soon mangled the name Einbeck to "ayn pock" and, eventually, to "ein bock" (one bock). And that's how the bock got to Bavaria.

Bockbier got its now-celebrated season as a result of what pious medieval brew monks did to the Pichler brew. The monks' religious regimen prescribed periodic bouts of fasting, when next to no solid food was allowed to pass their lips. The longest and most taxing of these periods of culinary abstinence was, of course, Lent. Because the monks believed that liquids not only cleansed the body but also the soul, they would make plenty of liquid instead of solid bread from their grain. They also drank it in copious quantities. Because the monks were society's role models in those religious times, their practices were copied by the common folk . . . and that's how bock got its very own winter season in Bavaria.

Finally, a quick point of grammar: You may have seen the spelling of both heller bock and helles bock (or dunkler bock and dunkles bock). Either ending is correct, but the difference rests with the grammatical gender of the implied noun. Because the word bock also means ram or billy goat in German, its gender is masculine (*der Bock*). Those who wish to label their strong Bavarian lager a pale or dark billy goat, therefore, should call it heller or dunkler Bock. The grammatical gender of beer (*das Bier*), on the other hand, is neuter. Thus, if you consider bock a shortened version of bockbier, you should call your brew helles or dunkles bock(bier).

Bock Brewing Tips

In the days of poorly modified grains, bockbiers needed to be mashed by a multi-step decoction, but with top-quality modern malt you can theoretically make a bockbier by just a single infusion. However, bockbier is a high-gravity brew. Because a high-gravity wort tends to come from a larger-than-usual amount of grain, all-grain bockmakers get much better extract efficiency, lautering speed and malt flavor, if the grain bed is allowed to hydrate for about an hour after a very thick dough-in at a temperature of around 100 °F (38 °C).

The simplest method for taking the mash to the mash-out temperature of 172 °F (78 °C) is to slowly but continuously, over about one hour, infuse it with a trickle of near-boiling water. During this continuous infusion, you can apply gentle direct heat as well, while stirring constantly to avoid scorching and hot spots. With this regimen, the mash will pass just long enough through the activity ranges of gum-converting enzymes (beta-glucanase, which reduce mash viscosity) and each of the two starch-converting enzymes (beta- and alpha-amylase, which produce fermentable and unfermentable sugars). The mash will also gradually thin out for easier lautering.

Note that, depending on your mash tun geometry, you may not be able to obtain the full 5 gallons (19 L) of wort at the specified gravity. The taller and narrower your mash tun, the more likely your mash will set and the less likely you can flush all available sugars out of the grain bed during lautering. To improve lautering efficiency, sparge your bock grain bed very slowly, perhaps for as long as 90 minutes. However, if you do get into lautering difficulties, remember that it is more important for your bockbier to get the right gravity than the prescribed volume. All-grain brewers who get less run-off than expected, therefore, have two choices: They can either work with the wort volume they manage to obtain and adjust the hop quantities proportionally, or they can "cheat" by liquoring the wort down to the required volume and then add some malt extract to "fix" the gravity.

Extract or partial-mash brewers, of course, can freely compose the ratio of extract and water to reach the bock's target gravity. Because of the bock's flexibility in the color department, just about any unhopped combination of Pils and amber malt extract can be turned into a bock, but German-style lager extracts obviously produce a more authentic result than do extracts intended for British-style ales.

Because all bocks are very smooth and malty-sweet, acrid notes are frowned upon in a classic bock. Most commercial Bavarian bock-makers, therefore, use either Weyermann dehusked Carafa malts or SINAMAR natural liquid malt color to "dunkel" their darker bock versions. Fortunately, both these products are now readily available to North American homebrewers. Feel free to experiment with the basic bock recipe presented here to make a Maibock or a dunkles bock, or any bock in between. In one direction, you can replace some of the color malts with additional dextrin malts (Briess Carapils or Weyermann Carafoam malts are good) or with Vienna malts. In the other direction, you can increase the amount of color malts or of SINAMAR liquid malt color. For the latter, use roughly 0.2 fl. oz. (6 mL) to darken 5 gallons (19 L) of bock by 1 additional SRM.

Also because bocks are overwhelmingly malty, hop additions for this heavy beer are surprisingly small. The average bock has IBU values that are comparable to most other Bavarian brews, that is, in the low 20s. At the very low end, bock IBUs start at roughly 15 for a doppelbock and at about 20 for a Christmas or dunkles bock. Neither bocks commonly has more than 25 IBU. The Maibock is the hoppiest of the bocks. Its IBU value starts where those of most other bocks end, at 25, and may be as high as 30. For further emphasis of maltiness in the finish, Bavarian bock brewers often omit aroma hops additions near, at or after the end of the boil. For bittering and flavor hops, use only the mildest noble hops varieties such as Hallertauer Mittelfrüh, Hersbrucker, Perle or the Northwestern triploid Hallertauer-derivative, Mt. Hood. For the darker bock versions, noble hops with a slightly more pronounced profile — such as Spalter and Tettnanger — can be used, too.

In high-gravity worts, yeast tends to start more slowly than in "regular" worts. For a bock, therefore, I usually pitch double the normal amount of yeast for twice the cell count.

Alternatively, you can make a yeast starter the day before brew day. Because of its high gravity and high alcohol content, a bockbier also requires a very robust workhorse of a lager yeast, such as the WLP820 (Oktoberfest) or WLP920 (Old Bavarian Lager) from White Labs, or the 2206 (Bavarian Lager) from Wyeast. No matter which yeast you choose, vigorously aerate the wort at pitching time. Inadequate oxygenation of the wort at the start of fermentation can cause the yeast to produce unacceptably high levels of solvent-tasting esters. To increase the chance of a vigorous fermentation even further, I also give the brew a second, long aeration session the day after brew day. ■

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Blue Danube Bavarian Bock

(5 gallons/19 L, all grain)

OG = 1.066 FG = 1.013
IBU = 22 SRM = 18 ABV = 6.8%

Ingredients

8.3 lbs. (3.8 kg) 2-row Pils malt (2 °L)
2.7 lbs. (1.2 kg) dextrin malt (2 °L)
2.0 lbs. (0.9 kg) Munich malt (10 °L)
0.75 lbs. (0.3 kg) crystal malt (60 °L)
0.65 oz. (18 g) de-husked Carafa Special Type I malt (320 °L)
4.9 AAU Hallertauer Mittelfrüh, Hersbrucker, Perle or Mt. Hood hops (bittering) (1.25 oz./35 g of 4% alpha acid)
0.5 oz. (14 g) Hallertauer Mittelfrüh, Hersbrucker, Perle or Mt. Hood hops (flavor)
White Labs WLP820 (Oktoberfest), White Labs WLP920 (Old Bavarian Lager), or Wyeast 2206 (Bavarian Lager) yeast
1 cup dry malt extract or corn sugar (for priming)

Step by Step

For best results, the following process relies on a practical continuous infusion mash, starting with a very thick dough-in at approximately 100 °F (38 °C) and a hydration rest of about an hour (longer is OK, too). Of course, there is nothing to prevent you from using the traditional decoction method, but the extra labor and complexity does not necessarily produce a better beer.

After the grain is thoroughly hydrated, apply gentle heat to the mash, stir it frequently to avoid hot spots and infuse it at a trickle with near-boiling water. Adjust the flow rate of the water so that you reach a thin mash at about 170–172 °F (77–78 °C) within about 90 minutes (longer is OK, too). Expect to use about two-thirds or more of your total brewing liquor. Before lautering and sparging, recirculate the wort until it runs clear. Sparge for about 90 minutes (again, longer is OK), while maintaining the mash-out

temperature. Boil for about two hours. Add bittering hops about half way through the boil and the flavor hops about 20 minutes before shut down. After shut-down, let the wort rest for about 30 minutes for improved trub sedimentation. Then rack the wort off the trub and cool to the optimum yeast fermentation temperature of 40–50 °F (4–10 °C). Pitch two packages of yeast or add the yeast starter and aerate twice as long as you normally would. Aerate again the following day. Allow about two weeks for primary fermentation. Once the brew is virtually still, let it settle for a few days. It is important for the clean taste of a bock to let all the spent yeast settle out. Then rack the brew and give it an optional diacetyl rest at room temperature for about two to three days, after which you should reduce the temperature by 2–3 °F (1–1.5 °C) a day until the fermenter temperature reaches approximately 28 °F (-2 °C), or as close to that point as possible. If you do not have the equipment to control the temperature reduction, wait another two weeks and then crash the temperature. Lager the brew for at least four weeks (eight to 12 weeks would be better). Prime (or carbonate) and package into bottles or a keg. If you prime your bock, let it condition at room temperature for about two weeks. After conditioning, bring the beer down to a cellar temperature of about 50 °F (10 °C) for storage. This is also the temperature at which you should serve it.

For a Maibock, follow the recipe above, but replace the entire grain bill with 5.3 lbs. each of pils and dextrin malts. For a dunkles bock, follow the above recipe, but quadruple the amount of Carafa Special malt.

Blue Danube Bavarian Bock

(5 gallons/19 L, extract with grains)

OG = 1.060–1.066 FG = 1.012–1.013
IBU = 22 SRM = 18 ABV = 6.4–6.9%

Ingredients

4.5 lbs. (1.9 kg) Weyermann Bavarian Pils liquid malt extract
3.2 lbs. (1.5 kg) Weyermann Munich amber liquid malt extract
2.0 lbs. (0.90 kg) Munich malt (10 °L)
0.75 lbs. (0.3 kg) crystal malt (60 °L)
0.65 oz. de-husked Carafa Special Type I malt (320 °L)
4.9 AAU Hallertauer Mittelfrüh, Hersbrucker, Perle or Mt. Hood hops (bittering) (1.25 oz./35 g of 4% alpha acids)
0.5 oz. (14 g) Hallertauer Mittelfrüh, Hersbrucker, Perle or Mt. Hood hops (flavor)
White Labs WLP820 (Oktoberfest), White Labs WLP 920 (Old Bavarian Lager) or Wyeast 2206 (Bavarian Lager) yeast
1 cup dry malt extract or corn sugar (for priming)

Step by Step

There seem to be no unhopped (or hopped) liquid malt extracts on the market that are specifically designed for a standard bock. So mix the specialty grains, cracked, in a muslin bag in about 2 gallons (7.6 L) of cold water. Raise the temperature of the steeping liquid over half an hour to 170–190 °F (77–88 °C). Lift the bag out of the liquid, rinse it with several cups of cold water and discard. After steeping the grains, fill your kettle to the usual volume and boil. Turn off the heat, stir in the two malt extracts and bring the wort back to a boil. Add the bittering hops after 15 minutes have elapsed and the flavor hops after 55 minutes. Shut-down after a total boil time of 75 minutes. Cool the wort, aerate thoroughly and pitch your yeast. Ferment at 40–50 °F (4–10 °C); primary fermentation should last about 2 weeks, at which time should perform a diacetyl rest. After the diacetyl rest, cool the beer to 28 °F (-2 °C) and lager for 4–8 weeks.

There is a seasonally available Weyermann Bavarian Maibock liquid malt extract on the market, which you can use to substitute the Bavarian pils liquid malt extract in the recipe above without significantly affecting the brew's color value. The Maibock liquid malt extract results in a greater depth of flavor, because it is made from a mix of Vienna, Carafoam and Carared malts instead of Pilsner malts. If you want to make a Maibock instead of a standard bock, you can use just this extract, without the specialty grains, in which case you need about 9.7 lbs (4.4 kg) of Maibock liquid malt extract. For a dunkles bock, follow the above recipe, but quadruple the amount of Carafa Special malt.

Blue Danube Bavarian Bock

(5 gallons/19 L, extract only)

OG = 1.060–1.066 FG = 1.012–1.013
IBU = 22 SRM = 18 ABV = 6.4–6.9%

Ingredients

0.9 lbs. (0.41 kg) Weyermann Bavarian Pils liquid malt extract
8.0 lbs. (3.6 kg) Weyermann Munich amber liquid malt extract
1.6 fl. oz. (48 mL) SINAMAR liquid malt color agent
4.9 AAU Hallertauer Mittelfrüh, Hersbrucker, Perle, or Mt. Hood hops (bittering) (1.25 oz./35 g of 4% alpha acid)
0.5 oz. (14 g) Hallertauer Mittelfrüh, Hersbrucker, Perle, or Mt. Hood hops (flavor)
White Labs WLP820 (Oktoberfest), White Labs WLP 920 (Old Bavarian Lager), or Wyeast 2206 (Bavarian Lager) yeast
1 cup dry malt extract or corn sugar (for priming)

Step by Step

Mix the two liquid malt extracts and the SINAMAR liquid malt color with hot brewing liquor in the kettle. Stir well and bring to a boil. Boil for 60 minutes total, adding bittering hops at the beginning of the boil and the flavor hops with 20 minutes left in the boil. See one of the other recipes for remaining instructions.

If you want to make a Maibock instead of the standard bock described above, replace both malt extracts and the SINAMAR with 8.9 lbs. (4.0 kg) of seasonally available Weyermann Bavarian Maibock liquid malt extract.

Everything About WATER

The best beer comes from the best water — Pilsen's very soft water, London's hard water, Rocky Mountain spring water, Michigan well water, Iowa spring runoff . . . or, maybe it doesn't. Maybe the best beer comes from making the best use of the water you have. How should you treat your brewing water? Boil it first? Filter it? Buy bottled water? How much water should you use for an extract batch? For steeping specialty grains? These are all common questions.

Everyone has heard about brewing water adjustments, whether it's an extract-based recipe calling for two tablespoons of gypsum or an all-grain recipe for Burton Ale that specifies mash water like that of Burton-upon-Trent. And, you may have read articles on how to calculate amounts of brewing salts to use, or why not to use them at all. Confused? Not sure when, why or how to adjust your water? Join the club, many other homebrewers aren't sure, either.

How you treat and use your brewing water depends on your brewing method. Are you brewing with malt extract? Extract with steeped specialty grains? All-grain? When you are brewing from scratch with malted barley, water chemistry can affect every aspect of the wort, including fermentability, flavor and clarity. When you are brewing with malt extract, all of the mash-related decisions have been made for you. For extract brewing, the emphasis needs to be on flavor, starting with: does the water taste good? If the water tastes good, the beer should taste good. Any further adjustments, such as brewing salt additions, need to take a back seat to more important variables like sanitation, general water quality, pitching an adequate amount of yeast and fermentation temperature control.

General Water Quality

The first thing to do is to determine how your tap water smells and tastes. Is it sweet and refreshing, conjuring up images of snow-capped mountains? Or does it remind you of verdant green ponds or the YMCA swimming pool? Could you practically build a car out of it? If the water smells bad, many odors (including chlorine) can be removed by boiling. However, many city water supplies use a chemical called chloramine instead of chlorine to kill bacteria. Chloramine cannot be easily removed by boiling and will give a medicinal taste to your beer. But, chloramine can be removed by running the water through an activated-charcoal filter or by adding a Campden tablet (potassium metabisulfite). Charcoal filters are a good way to remove most odors and bad tastes due to dissolved gases and organic substances. These filters are relatively inexpensive and can be attached inline to the faucet or spigot. Campden tablets are another way to remove chloramine and should be readily available at your homebrew shop. One tablet will treat 20 gallons,

so use half and crush it up to help it dissolve. Then proceed with the boil as usual. (If you use the whole tablet, it won't hurt the beer flavor at all.)

Water softening systems can be used to remove bad-tasting minerals like iron, copper and manganese. Salt-based water softeners use ion exchange to replace these metals with sodium and potassium. Softened water works fine for extract brewing but it removes the calcium and magnesium, that are needed for all-grain beers. When you are brewing with softened water, be cautious when a recipe calls for adding gypsum to the wort. Water softeners do not effect sulfate levels in the water and the malt extract may already contain sulfate. The combination of high sulfate with the typically high sodium levels from water softening systems can produce a very harsh bitterness.

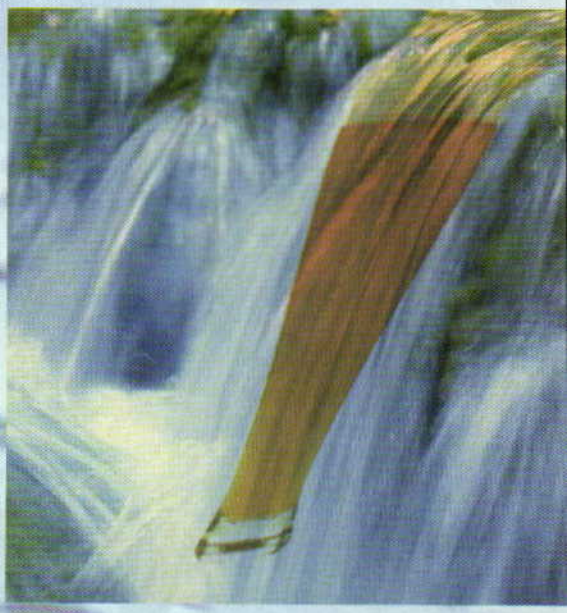
A good bet, if your tap water seems questionable, is the bottled water sold in most supermarkets. You should be able to get a mineral analysis of the bottled water by calling the manufacturer. I have done this with a couple of different brands. Bottled water is typically low in minerals like sulfate and carbonates, which makes it more adaptable for brewing.

Malt Extract Production

When you are brewing with malt extract, you are brewing with someone else's dehydrated wort. When liquid malt extract is produced, the typical starting wort specific gravity is about 1.065. The wort is then concentrated by evaporation to 80% solids by weight. All of the minerals that were present in their water and in their mash are still in the malt extract.

It is common for extract producers to add gypsum to their lighter colored mashes to help achieve the proper mash pH in areas of moderately alkaline water. Therefore, before you add more gypsum to a hoppy pale ale recipe, make sure you brew it without any sulfate ion additions first, so that you can gauge the bittering potential of your extract as-is.

When you add water to brew an extract batch, you are adding still more minerals from your local water supply



T E R

for **EXTRACT-BASED** Brewing

to those already present. So, you may be wondering if you should use distilled water to preserve the original mineral balance in the dehydrated wort. This isn't really necessary, though it won't hurt the situation. Most of the time, you can make an extract brew using your local water and you won't be able to detect a negative difference in flavor over a batch made with distilled water. However, if you live in an area of very minerally, high hardness water, you may want to use some distilled or bottled water in your brewing.

Brewday Water Considerations

Questions about water do not end with pre-brewing water treatment. They extend to the actual water usage on brewday. How much water should you use for steeping? For boiling? Should I boil the water first and let it cool overnight? Should I chill the water in the refrigerator?

The only reason to boil your brewing water before brewday would be to drive off unpleasant odors, or to be sure of its sanitation if you are on a well. There is no need to boil it and decant it off the calcium carbonate that precipitates. That practice is for all-grain brewers trying to reduce the water's alkalinity for mashing.

You have probably heard about the benefits of doing full-volume boils as opposed to partial boils containing all the malt extract. By doing a full volume boil, you are able to boil a lower gravity wort and prevent caramelization and darkening of the extract. In addition, a lower gravity boil will improve your hop utilization — you can get the same amount of bitterness out of fewer hops by boiling in a larger pot.

But what if you don't have the firepower to boil the full five gallons? Well, you can get the same benefit by only boiling half of your extract with your hops, and steeping the rest. Here is what you would do:

1. Prepare a typical gravity wort (1.040–1.050) using about half your malt extract and your usual boiling pot.

2. Re-calculate your hopping schedule based on this wort gravity and volume.

Salts for WATER ADJUSTMENT

Brewing Salt and Common Name	Concentration at 1 gram/gallon	Grams per Level Teaspoon	Grams per milliliter	Comments
Calcium Carbonate ($CaCO_3$) a.k.a. Chalk	105 ppm Ca^{+2} 158 ppm CO_3^{-2}	1.8	.36	Calcium facilitates beer clarity and yeast function. Carbonate will moderate some of the acidity and bite of dark beers. Because of chalk's limited solubility, it is best added directly to the wort boil. Use for making dark beers in areas of soft water.
Calcium Sulfate ($CaSO_4$*2 H_2O) a.k.a. Gypsum	61.5 ppm Ca^{+2} 147.4 ppm SO_4^{-2}	4.0	.8	Calcium facilitates beer clarity and yeast function. Can be used to add sulfate "crispness" to the hop bitterness.
Calcium Chloride ($CaCl_2$*2H_2O)	72 ppm Ca^{+2} 127 ppm Cl^{-1}	3.4	.68	Calcium facilitates beer clarity and yeast function. Chloride helps to round out the malt flavors.
Magnesium Sulfate ($MgSO_4$*7H_2O) a.k.a. Epsom Salt	26 ppm Mg^{+2} 103 ppm SO_4^{-2}	4.5	.9	Magnesium is a necessary yeast nutrient, but most yeast needs will be met by the wort. Can be used to add sulfate "crispness" to the hop bitterness.
Sodium Bicarbonate ($NaHCO_3$) a.k.a. Baking Soda	75 ppm Na^{+1} 191 ppm HCO_3^-	4.4	.89	Sodium helps to round out the malt flavors. Bicarbonate will moderate some of the acidity and bite of dark beers.
Sodium Chloride (NaCl) a.k.a. non-iodized table salt	104 ppm Na+ 160.3 ppm Cl-	6.6	1.34	Sodium and Chloride help to sweeten and round out the malt flavors.

3. Boil this small wort to achieve your desired hop bitterness, then turn off the heat and dissolve in your remaining extract. Most of the hot and cold break separation has occurred in the extract's production, so the extract does not need to be boiled again.

4. Finally, cool this high-gravity wort and dilute it in your fermenter. Aerate and pitch your yeast as usual. You have achieved the benefits of a full volume boil without actually boiling the entire batch.

Steeping Specialty Grains

When you steep specialty grains, you aren't trying to convert starches to sugars. You aren't trying to maintain a particular temperature for a period of time; you are making tea. By placing crushed specialty grain in a mesh bag and soaking it in hot water, you are extracting color and flavors that are already there. If you leave the grain bag in the pot too long, or boil the bag, you can develop astringent tastes from the malt husks. This is most noticeable when steeping the darkest malts, like roast barley or black patent malt. You can reduce this tendency by a couple ways. One is to steep in a reduced volume of water, around a half gallon per pound of grain (4.2 L per kg). Another way is to use bicarbonate (either sodium bicarbonate or calcium carbonate) to balance the acidity of these dark malts. One teaspoon of sodium bicarbonate (baking soda) per 4 gallons will add nearly 200 ppm of bicarbonate and will help you produce a smoother tasting stout.

Targeting a Beer Style

Many brewers are interested in duplicating a classic style from a famous brewing city. Depending on what your initial water chemistry is, you may want to add more sodium, chloride, sulfate, calcium or bicarbonate to better mimic a brewing city's water. These ions can be added in the form of non-iodized table salt, sodium bicarbonate, calcium chloride or gypsum. This is a common desire for brewing Dortmunder Export, Burton Ale, etc., but let's not put the cart before the horse. These styles grew out of the local water conditions, the brewers did not create the water to match their beer style. Water chemistry is hard to adjust because it is very interactive. The first time you try a salt addition to a recipe, you may want to cut the planned addition in half, because you don't know how much of the ions the extract is contributing. It is better to undershoot an addition than overshoot and ruin the beer.

There is a big, dirty secret when it comes to matching the water of brewing cities— published water reports are usually annual averages, often from multiple sources and the numbers may not add up. This means that the listed profile may be physically impossible to achieve, that the combination of ion levels listed cannot exist together. Also, breweries commonly treat their water. There's no guarantee a Dortmund brewery's brewing liquor resembles untreated Dortmund water. So, you need to be satisfied with a result that is "close enough." Flavor ion additions are added to the boiling pot where they are easier to dissolve.

Gypsum does not dissolve well in plain water, even in hot plain water; it needs the acidity of the wort. Epsom salt (magnesium sulfate) may also be used, and is often a component of Burton Salt mixes you may see at a brewshop, but magnesium can be easily overdone resulting in off-flavors.

Take a look at the chart on page 48 for the minerals in the water of South Bend, Indiana. Comparing these numbers to those of the brewing cities, you know that the water is similar to Dublin. If you wanted to brew a stout that was close to Guinness, you could compare these two water profiles to see if there was an ion that could be increased or decreased to help you find the desired flavor. If your water has low alkalinity, you may want to add some in the form of calcium carbonate or sodium bicarbonate to balance the acrid edge that dark malts like roast barley and black patent give. While this suggestion is most applicable when steeping specialty grain, it may also be used for an all-extract stout.

Brewing Water Adjustment

Now, before we begin, we all need to recite the First Rule For Adjusting Brewing Water: *Know What Your Initial Water Chemistry Is.*

Attempting to adjust your brewing water without knowing what you have to begin with is like taking medicine without telling the doctor what's bothering you. You have got to know what you are working with before you try fixing it. To calculate how much to add, use the table on page 48 to figure out what concentration is desired and then subtract your water's concentration to determine the difference. Next, consult the table on page 46 to see how much of an ion a particular salt can be expected to add. The ion contributions for the salts are for 1 gram dissolved in 1 gallon of distilled water. Unless you have a gram scale handy, you will probably want to convert the calculated weight of salt to volume, because it is more convenient. Teaspoon and milliliter equivalents for the salts are also given. Brewing software programs like Promash (www.promash.com) and Strangebrew (www.strangebrew.ca) will let you calculate how much of a salt to add to achieve a certain mineral profile, based on your water report and batch size.

As an example, let's say you wanted to brew a Dortmunder Export with South Bend water. Here is how the two waters compare.

1. First decide what ions you want to add. Looking first at the sulfate, sodium and chloride, we can see that about 60 ppm of sulfate and 20 ppm of sodium could be added. We can use gypsum to add the sulfate, and non-iodized table salt for the sodium. But what else do these additions contribute to the wort?

2. From the table on page 46, we see that 1 gram per gallon of gypsum adds 147 ppm of sulfate. To make up this difference, you would need: 60/147 = 0.41 gram/gallon of gypsum.

For this example, our final volume is going to be 5.5 gallons. Multiplying this amount by the volume gives you the total amount of gypsum to be added to the batch: 0.41 grams/gallon x 5.5 gallons = 2.25 grams

3. To convert this to volume, 1 level teaspoon of gypsum weighs 4 grams, so you would want to use 2.25 / 4 = 0.56 or a little over half a teaspoon. This would be about 2.8 milliliters.

4. This addition will also contribute 25 ppm of calcium (138 / 5.5) to the wort, which is well within the Dortmunder profile.

Calculations for sodium can be done the same way, but here is where you need to make some brewing decisions. How much is too much? If you were to add 1 gram of table salt to the batch to bring the sodium up to 60 ppm, you would also be contributing 29 ppm of chloride, bring that total to 91 ppm. Is that too much? Probably not. If you made the sodium addition using baking soda, you would be contributing 51 ppm of bicarbonate to the wort, and with the 376 ppm in the

WATER PROFILES from notable BREWING CITIES

	Ca^{+2}	Mg^{+2}	HCO_3^-	SO_4^{-2}	Na^{+1}	Cl^{-1}	Style
Pilsen	10	3	3	4	3	4	Pilsener
Dortmund	225	40	220	120	60	60	Export Lager
Vienna	163	68	243	216	8	39	Vienna Lager
Munich	109	21	171	79	2	36	Octoberfest
London	52	32	104	32	86	34	British Bitter
Edinburgh	100	18	160	105	20	45	Scottish Ale
Burton	352	24	320	820	44	16	India Pale Ale
Dublin	118	4	319	54	12	19	Dry Stout
South Bend	107	34	376	62	39	62	

Numbers are given in parts per million (ppm).

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Burton: Malting and Brewing Science, Vol. 1
Dortmund: Noonan, G., "New Brewing Lager Beer"
Dublin: "The Practical Brewer", p. 10,
Edinburgh: Noonan, G., "New Brewing Lager Beer"
London: "Fermentation Technology", p. 13, Westermann and Huige
Munich: Malting and Brewing Science, Vol. 1
Pilsen: "American Handy Book", 2:790, Wahl-Henius, 1902
Vienna: Noonan, G., "New Brewing Lager Beer"

water already, that is probably too much and would negatively affect the flavor.

Summary

Water adjustment for extract brewing is a lot simpler than for all-grain brewing. When you brew with malt extract, all the questions of mash chemistry and wort fermentability have been made for you. Thirty years ago this was a problem because malt extract was primarily produced for baking - extract brewers and extract producers did not have the same goals. Malt extracts were commonly cut with corn syrup and other sugars. These days however, extract brewers and beer kit producers have the same goal — brewing excellent beer, so you only have to worry about tweaking the flavor to your personal taste. ■

John Palmer is the author of "How to Brew" (2001, Defenestrative).

Decoction Mashing

How to tackle your first decoction mash

Story by Bill Pierce

Decoction mashes are a form of step mash. The basic idea behind a decoction mash is that the temperature is raised each step by taking a small amount of the mash (the decoction), boiling it, and returning it to the main mash. Decoction mashing was invented by German brewers at the end of the 18th and the beginning of the 19th centuries and evolved because malts were often of inconsistent quality. Decoction enabled them to extract the maximum amount of sugars from the grain and produce malty, flavorful beers using measurements that did not require precision instruments.

Why the bother?

The obvious question is, why bother decocting if modern malts no longer require it and accurate thermometers are readily available? Of course, some homebrewers have an interest in history and traditional methods and like to recreate them. But the real answer lies in the flavor of the beer that results. Some people claim that it is only possible to achieve the full malty flavor of certain beer styles through decoction.

Primarily these are styles that emphasize malt in the flavor profile, including the majority of German styles, especially malty lagers such as bocks, Munich dunkel and Oktoberfest. Also, many of the wheat beer styles, such as Bavarian hefeweizen, have traditionally been decocted. These beers are not highly bittered, although some of them, such as Pilsners, have noticeable hop flavor and aroma.

Boiling the mash, as well as the wort, results in chemical changes. Many of these are complex and involve darkening and caramelizing of the sugars. They are known as Maillard reactions and are responsible for a variety of generally pleasing flavors in food, including roast meat, bread crust and caramel. Some of them already occur during the malting process, but decoction also seems to bring them out more completely than conventional infusion mashing.

Not everyone agrees. A number of brewing academics and professionals argue that with only minor changes to a recipe, there should be no appreciable differences between a decocted and an infused beer. In the interest of reducing time, labor and energy costs, quite a few German breweries have abandoned decoction mashing without a greatly noticeable lessening of flavor.

However, as homebrewers we are less interested in saving time and making a profit. Moreover, there is something to be said for traditional methods and styles. If you like a rich, full malty character, it's worth trying a decoction mash and deciding for yourself if it results in better beer.

Mad science

Although boiling of the wort is almost universally practiced, boiling of the mash may seem highly unconventional and raises technical questions. Extract brewers are warned not to boil any steeped specialty grains and a standard infusion mash, by definition, is never boiled. Excessive temperatures can leach tannins from grain husks, leading to a harsh astringency in the beer. Additionally, the amylase enzymes in the malt that convert starches to sugars are inactivated at temperatures above about 158 °F (70 °C) and can be destroyed by boiling.

Why then doesn't decoction mashing lead to astringent beer and an enzyme-deficient mash? The answers lie in the chemistry of the mash. Only the thicker portion, containing more of the grain solids, is boiled. Malt is rather acidic and — in the thick, boiled portion — the pH is relatively low (about 5.0). This results in relatively few tannins being leached from the husks. As for enzyme denaturing, this is not a practical problem because most of the malt enzymes are dissolved in the mash liquid when the grain and

Doctor Decoctor's Doppelbock
(5 gallons/19 L, all grain)

OG = 1.078 FG = 1.020
IBU = 28 SRM = 14 ABV = 7.4%

Ingredients

13.2 lbs. (6.0 kg) Munich malt
3.4 lbs. (1.5 kg) Pilsner malt
0.6 lbs. (0.27 kg) Carahell Dark malt
6.75 AAU Northern Brewer hops (0.75 oz./21 g of 9% alpha cids)
3.4 AAU Hallertauer Mittelfrüh hops (0.75 oz./21 g of 4.5% alpha acids)
1.0 tsp. Irish moss (15 min.)
Wyeast 2206 (Bavarian Lager) or White Labs WLP830 (German Lager) yeast (2-qt. (1.9-L) starter, minimum)
⅔ cup corn sugar (for priming)

Step by Step

Mash in grains with 4.7 gallons (18 L) of water to 123 °F (51 °C). After the mash has rested 5 minutes, pull your first, thick decoction and bring it to a boil. Boil the decoction for 30 minutes while the main, thin portion of the mash continues to rest at 123 °F (51 °C). Add the decoction back to the main mash to boost the temperature to 158 °F (70 °C). Let the mash rest for 45 minutes, then pull your second decoction. Boil this decoction for 20 minutes while the main mash continues to rest at 158 °F (70 °C). Add the second decoction back to the main mash for the mashout to 168 °F (76 °C). Boil wort for 115 minutes, adding bittering hops with 60 minutes remaining and flavor hops with 20 minutes remaining in the boil. Primary fermentation should last approximately 18 days at 52 °F (11 °C). Lager for 12 weeks at 38 °F (3.3 °C) Prime with 80 grams (about ⅔ cup) corn sugar for 2.3 volumes CO_2.

hot water are mixed. In a decoction, the thin liquid in the unboiled portion contains more than sufficient enzymes to convert the starches, both in itself and in the boiled portion when it is returned to the main mash.

Consider a double decoction as a step mash with a protein rest, saccharification rest and mashout. A single decoction is analogous to a single infusion mash with mashout, and a triple decoction is a three-step mash (acid rest, protein rest, saccharification rest or protein, beta rest, alpha rest) and mashout.

Tools for the job

Decoction mashing requires more time (typically another 45–60 minutes for a double decoction) than a conventional infusion mash, and requires some additional equipment. There is also a certain amount of multi-tasking involved. Decoction is not recommended for beginning all-grain brewers; it's best to have some experience and be relatively comfortable with the mashing process in general before attempting your first decoction.

The primary additional piece of equipment is a pot in which to boil the thick portion of the mash. It can be quite a bit smaller than the mash tun; for normal gravity beers (O.G. of 1.060 or below), 20 percent of the total batch size is a minimum. For example, for a five-gallon (19-L) recipe, a four-quart (3.75-L) pot would be the smallest you would want to use. A somewhat larger size would allow you to decoct higher gravity recipes. A thick bottom is highly desirable to prevent burning of the mash that is boiled.

You will also need a burner with good heat control. A typical large burner on a kitchen stovetop is adequate for 5–10 gallon (19–38 L) batches. On another burner, heat about 2 gallons (8 L) of water nearly to boiling, or you can add an additional volume of water to the vessel you use to heat sparge water. A large slotted spoon is an excellent tool for removing and returning the decocted portion of the mash.

Doing the deed

For a double decoction, mash in at 122 °F (50 °C). For a triple decoction, mash in as if for an acid rest at 104 °F (40 °C). For a single decoction, mash in at the saccharification temperature called for in the recipe, typically from 149–158 °F (65–70 °C). The thickness of the mash is usually slightly thicker than that of an infusion mash.

I like mashing in with a water to grain ratio of about 1.1 quarts of water per pound of grain (2.3 L per kg) for a double decoction. Calculate the temperature of the strike water based on your mash tun's thermal characteristics and the temperature of the grain. This is typically 8–12 °F (4–7 °C) higher than the temperature of the rest.

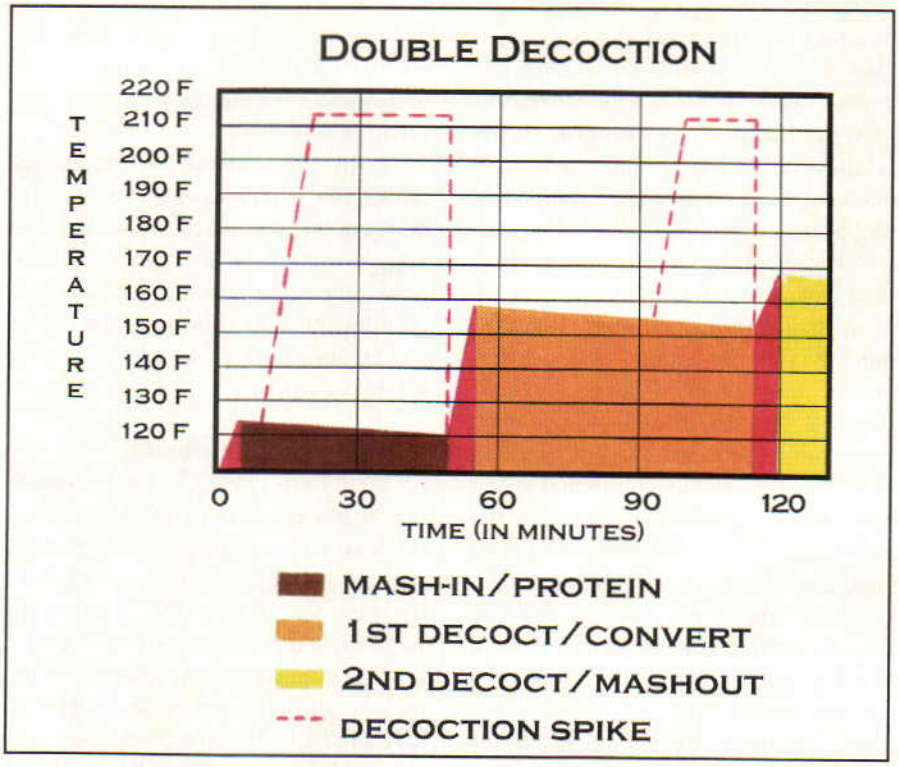
Stir the grain and water well so that there are no dough balls. Allow the temperature to stabilize. If you measure the pH and make brewing salt

or acid adjustments to the mash, now is the time to do so. At this point (about 5–10 minutes after mashing in), begin the decoction.

Remove approximately one-third of the total volume of the mash to the pot you will use to boil the decoction. It's important that this be the thick portion of the mash; it should have the consistency of hot oatmeal you would serve for breakfast. What remains in the mash tun should be quite thin and soupy. Cover the mash tun and let it rest at the mash in temperature.

Bubble, toil and trouble

Place the decoction pot on the burner and apply medium-high heat. The goal is to heat the decoction evenly and at a rate of about 4–5 °F (2.5–3.1 °C) per minute. This will require frequent, but not constant, stirring. The reason a thick bottom is recommended is to reduce the chances of scorching the mash. As the temperature increases and the mash thickens,



A graphical representation of the double decoction mash for the recipe on page 49, taken from ProMash. Temperatures for the main mash are given by the solid line with shading underneath. The temperature of the decoctions is shown as a dotted line.

you may find that sticking is a problem. Add a large spoonful or two of nearly boiling water and continue stirring to thin the consistency as needed. This is a deviation from the traditional method, but is a practical solution to the problem of sticking.

Eventually the decoction will come to a boil. Adjust the heat to maintain a slow boil without burning. Stir frequently and add boiling water as necessary to prevent sticking. Maintain the boil for 25–30 minutes, at which time you can remove the pot from the heat. Uncover the mash tun and spoon the boiled portion back into the unboiled mash; stir until it is mixed well and take a temperature reading.

It is entirely possible that the temperature will not be as high as desired for the saccharification rest (or the protein rest or mashout if you are doing a triple decoction or single decoction). If not, merely add boiling water, stir and take readings until the temperature is correct. In the less likely event that the mash is too hot, add small amounts of cold water. Again, this is not a traditional technique, but it works on a homebrew scale.

Cover the mash tun once again and allow the enzymes to convert the starches in the mash to sugars for about 45 minutes. If you are doing a triple decoction, the rest will be 30 minutes for a protein rest, and about 10 minutes for mashout if a single decoction.

Once more with feeling

If you are double or triple decocting, again remove about one-third of the total volume. It should the thickest portion, although not quite as thick as the first decoction. Once again, bring the decocted portion to a boil. You can heat the decoction somewhat more quickly this time, stirring frequently and adding boiling water as necessary to avoid sticking. Second and third decoctions should be boiled for about 20 minutes.

Return the decoction to the mash tun at the end of the boil. If this is the final decoction, the target temperature is 168–170 °F (75–76 °C) for mashing out, which helps ease sparging and facilitates rinsing of the sugars from the mash. If the mash temperature is too low or too high, again add boiling or cold water as necessary. Normally 10 minutes is sufficient for mashout, at which time you can begin recirculation, runoff, sparging and boiling of the wort as you would with any mash.

The first time you decoct it may seem like a lot of juggling and time pressure, but the process soon becomes very logical and straightforward. The extra investment in time and effort will be very rewarding when you savor the rich, full malty character of your beer and feel a kinship with the brewers who developed this traditional technique nearly 200 years ago. ■

Bill Pierce wrote "Brewing the Big Ones" in the Dec. 2003 issue of BYO.

Keeping it Cool

The lowdown on brewing lager beers at home

story by Chris Colby

Lager beers differ from ales in that they are fermented at lower temperatures, using different yeast strains than those used in ale production. Lagers also require a period of cold conditioning after primary fermentation is complete. The word "lager," which comes from the German word for "to store," gets its name from this period.

Most homebrewers ferment their lagers at 50–55 °F (10–13 °C), although some lager yeast strains will perform well at temperatures as low as 46 °F (8 °C). In addition, "steam" lager yeasts can be used up to 65 °F (18 °C). Later, you need to condition, or lager, it at below 40 °F (4.4 °C) for a few weeks.

An unfrozen freezer

One solution to the problem of maintaining proper fermentation and lagering temperatures is to get a dedicated brewing fridge or freezer. Most full-sized refrigerators will hold two carboys or three Cornelius ("Corny") kegs. Chest freezers vary in size and can hold from one to several carboys and cost less than a fridge. The only disadvantage of a chest freezer is that you have to bend over to move full carboys in or out of the freezer. There are, however, carboy parkas or strap haulers that make this easier. When using a chest freezer for brewing, you should apply waterproof caulk to the bottom, inside edges of the unit. This will prevent rust from forming in the seams due to condensation runoff.

Refrigerators or freezers, however, can't maintain temperatures in the 50–55 °F (10–13 °C) range. To use them, you need to override their built-in thermostat with an external unit. I have a Johnson Controls thermostat, sold at many homebrew shops for around $50 (U.S.).

More Yeast

When brewing a lager, the first thing in your procedure that is different is the volume of yeast starter you need to make. Lagers require more yeast than an ale does to ferment properly. The optimal pitching rate for a lager is twice that of an ale. To get this many yeast cells, make a 1 gallon (3.8 L) yeast starter by boiling 12 oz. (0.34 kg) of dried malt extract in a gallon of water for 15 minutes. This makes a wort of SG 1.035. Cool the wort to 70 °F (21 °C) and pour it into a clean, sanitized jug. After aerating well, pitch the yeast and let it ferment for 3-4 days at room temperature. On brewday, decant the beer from the starter and pitch the yeast sediment.

More cooling

On brew day, the first procedural difference you will encounter — unless you do a step mash or decoction mash, which are used in the production of some lagers — comes at the wort cooling stage. Lager fermentation temperatures are much cooler than that of ales and thus you need to cool your wort more. If your tap water is at least 10 °F (5 °C) lower than lager fermentation temperatures, this is no problem — just leave the immersion chiller submerged awhile longer or slow the flow of wort through your counterflow chiller. If, however, your tap water is equal to or warmer than lager fermentation temperatures, you will have to cool it before you run it through your wort chiller. The easiest way to do this is to use a pre-chiller. A pre-chiller is simply a separate immersion chiller that precedes your main wort chiller. Dunk the pre-chiller in an ice bath once you reach the point that your tap water is no longer effectively cooling the wort. Swirling the pre-chiller around in the ice water — or circulating cold water with a pump — increases the effectiveness of the pre-chiller.

When you first put your carboy in your lager fermentation chamber, take care to avoid suck back in your fermentation lock. When you put a carboy in your fridge or freezer, the air in the headspace will likely be warmer than its surroundings (unless you are brewing outside in cold weather). Once in

photo by Chris Colby

This 14.8 cubic foot chest freezer holds four 6.5 gallon (25 L) carboys or seven Corny kegs. Although the temperature cycles up and down 4 °F (2 °C) around the set point, the temperature of the beer stays almost constant.

An indoor/outdoor thermometer (front) allows you to monitor the temperature inside the freezer without lifting the lid.

the fermentation chamber, the air will cool down and contract. This can pull liquid from your fermentation lock into the beer. To avoid this, use a sideways "S" shaped lock instead of the three-piece "jiggle hat" lock. And, use only a small amount of water in your "S" lock. If you add just enough to barely seal the bottom of the lock, it will gurgle backwards instead of pulling the column of water into the beer. Once fermentation starts, add a little more water to the lock.

More stink

Once you've pitched your yeast, fermentation should begin within 24 hours. At that time, you will notice something you didn't when brewing ales — lager stink. Lagers give off an unpleasant sulfury smell as they ferment. Don't panic, as some first-time lager brewers have done, and pour out the beer because you think it's contaminated. It's supposed to smell that way.

Keep the temperature constant during fermentation and the yeast will steadily reduce the beer's specific gravity. Near the end of fermentation, however, the rate of attenuation may slow a bit. This is a good time to raise the temperature and perform a diacetyl rest.

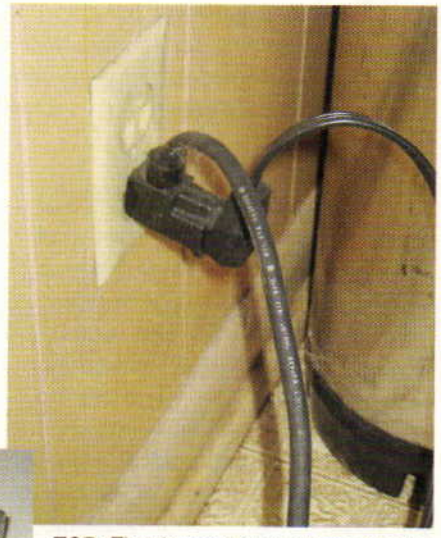
Reducing diacetyl

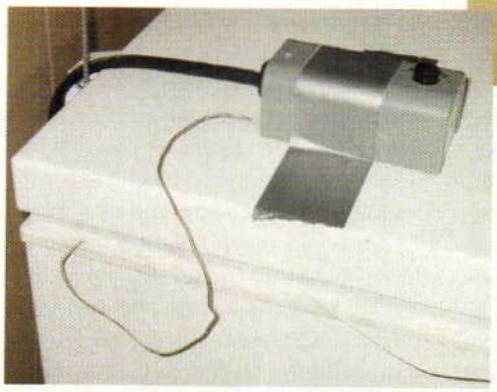
As beer ferments, yeast excretes a molecule known as alpha acetolactic acid. In wort, this molecule gets oxidized to diacetyl — a substance that lends a buttery or butterscotch character to beer. In some ales, this is a desired (or tolerated) trait; in lagers, diacetyl is undesirable. (Note: because Pilsner Urquell currently shows a bit of diacetyl, some people think it belongs there. Others believe the brewery has a contamination problem they haven't fixed yet.) In most ales, the yeast absorbs diacetyl such that it is below the flavor threshold at the end of primary fermentation. In many lagers, however, this is not the case. They are noticeably diacetyl-laden after primary fermentation. The traditional way of dealing with this problem was to kraeusen the beer, then lager it for extended periods of times, with 3

months being typical. Kraeusening is the process of adding vigorously fermenting wort to nearly fully attenuated beer. Typically, brewers would add an extra 10% of fermenting wort to their almost fermented beer. The wort added was at or near the most vigorous stage of fermentation and the active yeast helped to both absorb diacetyl and to fully attenuate the beer.

Few homebrewers perform kraeusening because it requires some extra planning. If you want to, siphon roughly 2 qts. (2 L) of cooled, unaerated, unpitched wort to a sanitized container. Cap lightly enough so that air can get in and out of the container and put it in your refrigerator. The next day, tighten the cap. Three or four days before you kraeusen, take the wort out of the fridge, let it warm to lager fermentation temperatures, then aerate and pitch the wort with the yeast you used in your main batch of beer. Put a fermentation lock on the "kraeusen starter" and put it in your lagering chamber. Add it to your beer when it's vigorously fermenting.

The modern approach to diacetyl reduction is to use a diacetyl rest. To do this, allow the temperature of your lager to rise to 60 °F (16 °C) before cooling the beer for lagering. The amount of time spent in a diacetyl rest varies, typically from 2 to 4 days. The ability of lager yeast to absorb diacetyl is somewhat unpredictable. Sometimes they do so quickly; other times it takes longer than expected. It's better to take





TOP: The thermostat is plugged in the wall and the freezer plugs into the thermostat.

LEFT: A probe (the silver wire) goes inside the freezer and monitors the temperature. If it exceeds the set point, the thermostat turns on power to the freezer. When the temperature drops 4 °F (2 °C) below the set point, the thermostat cuts power to the freezer.

a small sample and taste for diacetyl than simply relying on timing. Once you can no longer taste diacetyl in your beer, you are ready to lager.

Racking to secondary

Once your diacetyl rest is complete, rack the beer to your secondary fermenter and prepare for lagering. You may notice a couple differences from racking ales. Because lagers are fermented colder, they retain more carbon dioxide (CO_2) than ales do. They aren't carbonated to the level a finished beer is, but you will probably see bubbles breaking out of solution as you transfer. I tap my racking cane to dislodge these bubbles clinging to the inside of the tubing. I do not want them to "grow" and break the siphon. Another difference I've noted is that sometimes the tubing on my racking cane gets very rigid as the cold beer moves through it and this makes it harder to get the outflow end of the tubing to the bottom of the receiving carboy. If this happens, tilt the receiving carboy to receive the first bit of beer with a minimum of splashing. This only happens when I use "hard" vinyl tubing I get at the hardware store, not the "soft" tubing usually sold at homebrew stores.

Since the lager is going to condition for at least a few weeks, it's best to rack it to a carboy with as little headspace as possible. This lowers the amount of oxygen that will come in contact with the beer. Once you've racked the beer to secondary, it's time to begin cooling. Optimally, you want to cool the beer down by a couple degrees Fahrenheit per day. This is easy to do with a chest freezer and external thermostat; just change the set point on the thermostat once a day. If you can't cool gradually, crash cooling will also work.

Once you reach lagering temperature — below 40 °F (4.4 °C), but as low as 30 °F (-1.1 °C) — let the beer sit until it has conditioned. During this time, many things happen to the beer. However, as the brewer, there is nothing to do except wait. You can accelerate conditioning time slightly by fining for proteins or tannins, or filtering out the beer's chill haze, once it has formed. Most commercial lagers spend less than a month at the brewery. As a homebrewer, you can let your beer age a little longer — from around 6 weeks for average-strength beers to several months for big lagers such as doppelbocks or Baltic porters.

Once the beer is lagered, you can rack it over to a keg. As it was stored cold, it will likely have retained some carbonation and will only take a day or so under CO_2 pressure to be ready to serve. If you bottle condition your beers, you will need to store them at room temperature for a few weeks. Test for carbonation by opening one bottle before refrigerating the remaining bottles. ■

It would take more than a freezer to make BYO editor Chris Colby cool.

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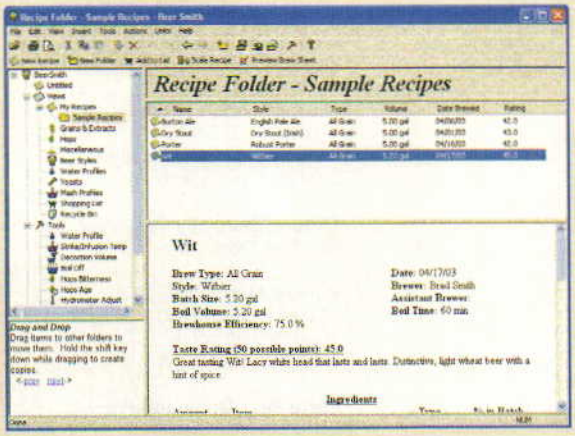
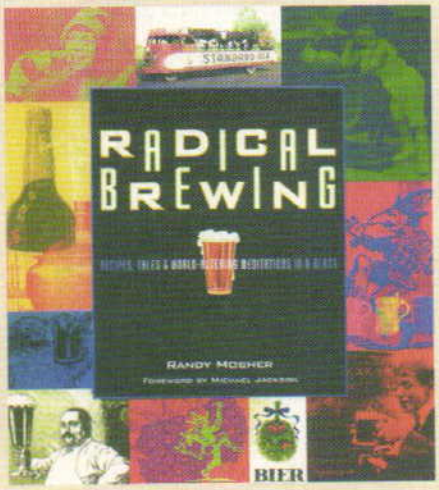
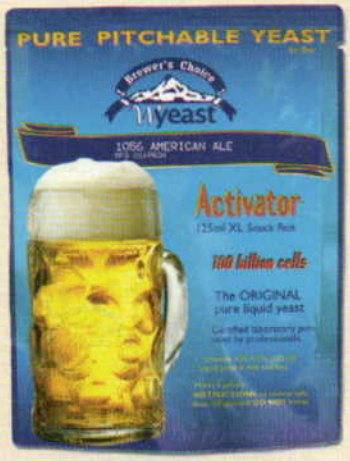


BeerSmith 1.2 is a new recipe formulation software designed to help brewers with tools including style, color and gravity analysis. The software generates detailed brewing instructions and populates hops, grain, adjunct, water, style, yeast, equipment and mashing databases. It is designed to work as a brewing calculator that will determine values and administrate unit conversions. The equipment database acts as an adapter between various recipes and systems, allowing a brewer to scale any recipe to his system's specifications. For more information visit www.beersmith.com, where a free 21-day trial version is available for download. The full BeerSmith 1.2 software sells for $19.95.

Randy Mosher and **Brewers Publications** have released a book entitled "Radical Brewing: Recipes, Tales and World-altering Meditations in a Glass." With over 500 photos, drawings and labels and 139 recipes, this 347-page soft cover delves into the world of offbeat brewing. Each chapter explores new brewing frontiers and "outside-the-lines" approaches to homebrewing. The informative text is meant to inspire the experienced and novice homebrewer alike. For further information or to purchase the book ($19.95 plus shipping) visit www.radicalbrewing.com or call 888-822-6273.





Wyeast Laboratories has introduced a new product called the ACTIVATOR, Pure Pitchable Yeast. Each "Smack Pack" has an average of 100 billion cells of pure yeast ready to pitch, plus yeast nutrients. The number of active yeast cells in the ACTIVATOR doubles that of Wyeast's current "XL" 125 mL size and provides more active cells than any product on the market. The Activator "Smack Pack" is the only package design that allows the brewer to activate the yeast prior to using. For further information and to locate a homebrew shop that carries this product, visit www.wyeastlab.com or call 541-354-1335. ■

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Labels with Love

What the kids can bring to your hobby

by Will Oliver
Huntsville, Texas

Between home brewing and fatherhood, there are really not too many collisions — I usually brew on my own. In fact, the most opportune time is when my wife goes shopping, otherwise she cringes at the mess I make in the kitchen. My kids are usually around when I homebrew and they run around the house yelling, "Ooh, it stinks! Daddy's making beer again." Since they think it stinks, they usually don't hang around long — but they do like to help me put on the bottle caps.

I made my first batch about two years ago after having saved enough brown bottles to get started, which was very hard "work." I told my wife that I wanted to have my own beer labels one day, but I never seemed to get around to creating them. Imagine my surprise on Christmas morning when I opened my best gift of the year — a case of my very own bottles with homemade labels on them! What made the gift even more perfect is that the labels were made by my three kids, Paul, James and Sarah.

My wife had the kids draw pictures on small pieces of paper and then taped the labels onto the bottles. My oldest son Paul, who is seven, was creative in naming each beer for the pictures he drew. For instance, Paul is really into dinosaurs so he drew a picture of *Carnotosaurus* (a large meat-eating dinosaur) and named it Carnotosaurus Beer. On another label he drew a picture of a bottle of beer and named it Beer Beer. My youngest son, James, who is six, likes penguins, so I now have a remarkable Penguin Beer, as well. Sarah, who is three, was less excited about naming beers, but is really into the color pink. She used many other pretty colors on her labels and they're beautiful.

I took a picture of the three of them that morning in front of the tree with their personally designed bottles. I would have to say this was a high point in my brewing career. A week later I received a copy of *BYO* that had an advertisement for the beer label contest in it and thought, "Why not?" I submitted two of Paul's labels Ouranosaurus Beer and Ceratosaurus Beer for consideration.

My job has pretty flexible hours, so every six weeks I take an afternoon off to brew or bottle. I am a criminal justice professor at Sam Houston State University in Huntsville, Texas. I also write books and publish journal articles. My wife always says my brew "tastes like beer" and I always thank her for the compliment. My friends like my brew and generally say it beats commercial beers.

The labels were a nice Christmas present and I was really happy to get them. No more plain brown bottles and each bottle is unique. That was why I had to enter them into the contest when I came across the issue of *BYO* announcing the contest. I wasn't sure what category they would fall into, but imagine the surprise when my kids found out that they're getting a whole story written about them. They are running around now saying, "We're going to be famous like Daddy!" ■

PHOTO COURTESY OF WILL OLIVER

Above: (from left to right) James, Sarah and Paul Oliver proudly display their Christmas presents to their father, Will.

Left: Who wouldn't want their own Ouranosaurus Beer? After all, the *Ouranosaurus* has been around for 110 million years!

Right: Equally tasty and similar in flavor is the Ceratosaurus Beer, remnants of which can be seen here. *Ceratosaurus* is also known as the horned lizard, named for the unusual horn on its nose. It is said that this horn may have doubled as a prehistoric bottle-opener in the Jurassic period.



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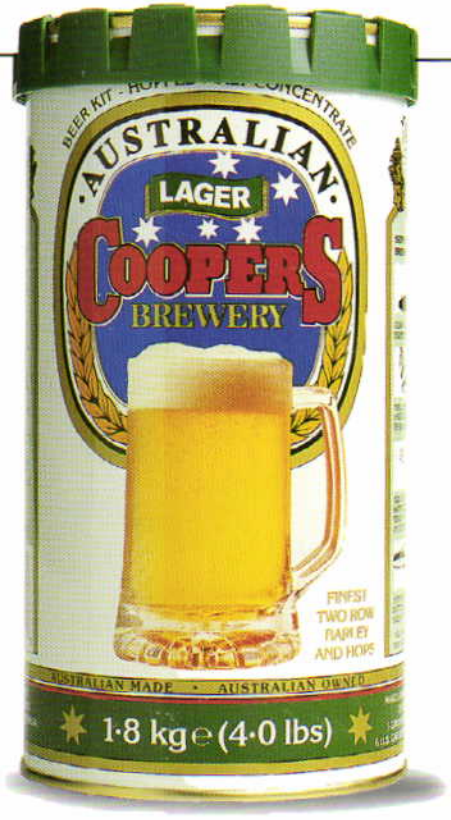

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