Brew Your Own®

January 1998, Vol.4, No.1
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THE HOW-TO HOMEBREW P[illegible]AZINE

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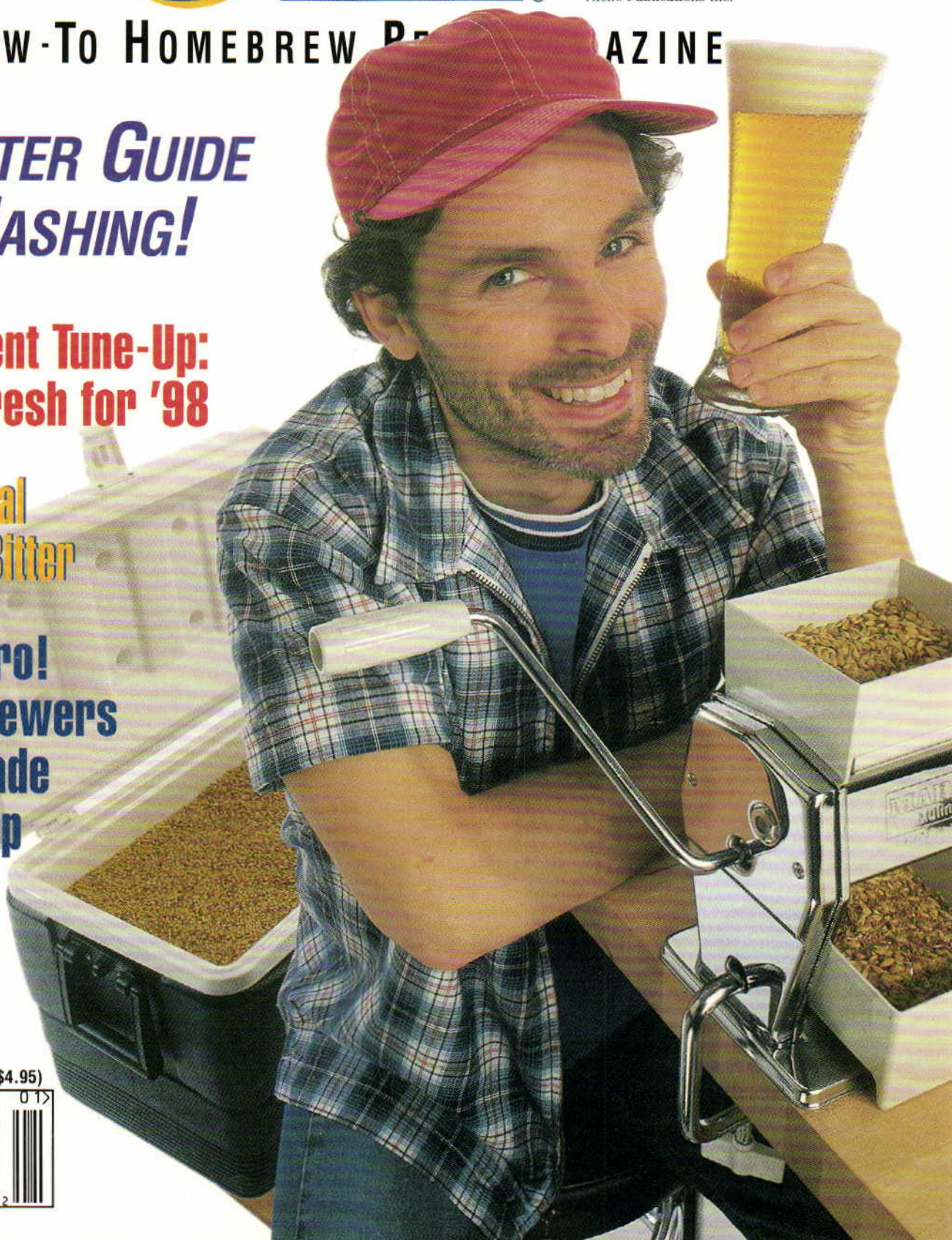
Equipment Tune-Up: Start Fresh for '98

Brew Real English Bitter

Going Pro! Homebrewers Who Made the Jump



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Cover photo: Kent Lacin

Resolution Time Again

We've reached that time of year again when I embarrass myself in print by making New Year's resolutions.

Before we begin, let's take an inventory of last year's promises. Last year I took the conservative approach, only making a couple of resolutions so I could be sure to keep them. They were based on the fact that I was running out of bottles. The reason: I never rinsed them out when I finished the beer, so the yeast left on the bottom hardened to concrete.

Let's see how things went.

Resolution 1 for 1997: Drink more commercial beer in 22-ounce bottles so that I'll have more bottles for my homebrew. Score one for living up to promises!

Resolution 2 for 1997: Rinse homebrew bottles as soon as I'm done with them. Okay, well, you can't win them all.

Final batting average for 1997 resolutions: .500. You may not think that's so great, but believe me, I've done a lot worse.

On to 1998. This year I've decided to go with quantity over quality. The scatter-gun approach rather than a few well-reasoned resolutions. Damn the torpedoes!

Resolution 1 for 1998: Never, ever (again) buy 10 packs of liquid yeast because I forget to make a starter.

Resolution 2 for 1998: Never, ever (again) forget to pay attention and boil the bejeebers out of those "steeping" grains.

Resolution 3 for 1998: Never, ever (again) substitute coriander for cardamom in that spiced beer recipe because, well, they both begin with C.

Resolution 4 for 1998: Never, ever (again) say the words "Beer doesn't stain." (It was a joke, I swear!)

Resolution 5 for 1998: Never, ever (again) promise to do any chores involving sharp objects after a brewing session.

Resolution 6 for 1998: Always (from now on) use the thermometer method — rather than the finger method — to determine mash temperature.

Resolution 7 for 1998: Always (from now on) make sure I know where the bottle caps are before I fill all the bottles.

Resolution 8 for 1998: Always (from now on) *measure* the amount of corn sugar I'm using for priming.

Resolution 9 for 1998: Always (from now on) bottle in the kitchen, with the tile floor. Not in the family room, with the carpeted floor.

Resolution 10 for 1998: Always (from now on) keep at least two bottles of homebrew in the refrigerator for "special occasions." This one I think I can keep.

How will this all work out? Stay tuned until next year...

Meanwhile, this month's issue offers a few possibilities for your own resolutions. On the "should do" side is Equipment Tune-Up (page 20). It examines in detail how to make sure your equipment is fine tuned for another year of great brewing. Parts you should replace, parts you should give a little extra cleaning — parts you should have cleaned a long time ago! Make your brewhouse run like clockwork.

On the "fun to do" end is the "Starter Guide to Mashing." If you haven't tried mashing or you just want to brush up on your skills, this article takes you through the hows and whys, step by step. It begins on page 32.

Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

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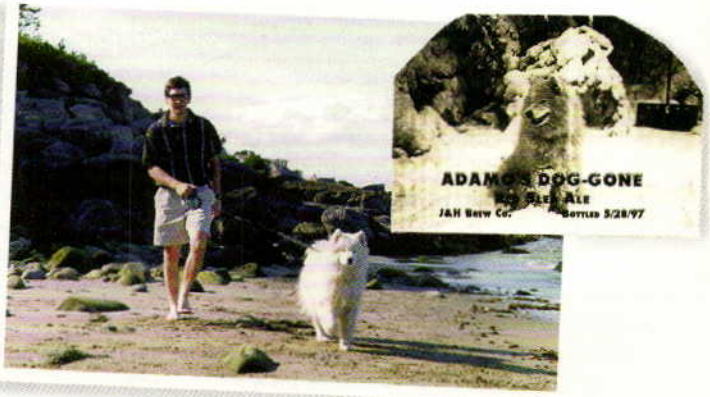
Furry Brew Partners

John Adamo
Enfield, Conn.

Coco is a four-year-old Samoyed who's a great brewing companion. She's the inspiration behind our brewery name, Adamo's Dog-gone; our labels; and many of our beer names, such as Muddy Dog Ale (a brown ale) and Red Sled Ale (an Irish red ale).

Here's a shot of us on our vacation in Maine. With the winter brewing season here, I know we'll soon be in the backyard playing in the snow and using a snowbank to cool the wort.



A star needs her exercise. Coco's credits include Red Sled Ale (right).

Wort the heck is in there?

Nancy DenDooven
Portland, Ore.

I've enjoyed the stories about families and couples who brew together, but let's not forget our brewing pets. As a single, child-free homebrewer I brew with my cats — when they deign to show interest in anything Mom does besides opening a can of cat food.

Ginger finds the bubbles coming from the blow-off hose quite fascinating, as you can see in the photo. Or maybe it was the aroma she was enjoying. Little Buddy had just finished reading BYO, so he knew the importance of sanitary brewing and stayed out of things.

Despite the paws-on interest by my kids, the beer turned out quite tasty.

Brian Danziesen
East Norriton, Pa.

Yo brew guys, check out this canine brewmeister. Her name is Guinness. You guessed it, named after the famous, never-ending creamy froth head of Guinness Stout. Guinness is just a puppy, but we have been brewing together for more than a year now and she helps out in every way. She's the beer slave and my right-hand pup in the sanitation department because nothing makes it to the floor.

Guinness is such a hard worker; you know how hard a full day of fetching beers and cleaning carboys can be. But most of all, Guinness is an intricate part of the brewing process. She is head of quality control, checking for clarity, aroma, and mouthfeel. Guinness loves homebrewed beer so much that she makes Barney (from the Simpsons) look like a novice beer drinker.

Guinness is an important part of the cleaning and tasting process.

Luis Gonzales
Danbury, Conn.

Some time ago, while brewing up a batch of yummy homebrew, I noticed that my cat seemed very interested. He sniffed each piece of equipment, seemed to appreciate the scent of the boiling wort, and was at my side throughout the brewing process. After the brew had fermented, he showed the same active interest in the bottling. I offered him some of the unbottled homebrew, and he drank it.

Thus, it seems, that cats are keen homebrew enthusiasts. There are, however, a few points that I would like to share regarding homebrewing with cats:

1. Involve your cat. If he is not already sitting on your kitchen counter as you brew, call him. Of course he won't come. Cats never do. So seek him out, remove him from the radiator, and put him in proximity to your brewing setup.

2. Allow your cat to criticize or contribute to your recipes. As I brewed my last batch of homebrew, I observed Fluffy seated upon the racking tube that I had just sanitized. In such circumstances, if you wish other cats to sample your brew, do not resanitize. You know how cats greet each other, so allow the cat-butt aroma to flavor your beer, thus ensuring that each cat who tries it will be enthusiastic in its response. If you do not want other cats to savor your beer, leave it anyway. Who knows? You might create a new style. However, I think the Belgian monks discovered this secret many centuries ago.

3. Keep your cat involved in the entire brewing process. Fluffy watched me closely as I bottled my beer. So I playfully squirted some homebrew from my siphoning hose toward Fluffy.

To my delight he spent many hours grooming himself of the sticky stuff. Thus the cat receives needed reinforcement for clean habits and hours of worthwhile enjoyment that would otherwise be spent in sleep or in rooting through your garbage.

The first trick to brewing with your favorite cat is getting its attention away from its favorite sun-warmed spot.

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Siphon Starter

Dear Brew Your Own,

In response to Frances Besne's contribution in "Brewing at 60" (Pot Shots, November '97), here's a trick I use to start a siphon (although her way of using vodka didn't sound too bad).

I use a carboy rubber cap with two spout openings. I insert a racking tube into the center opening and place a stopper with a hole onto the other opening. I then place a gallon plastic milk jug over the stopper. Squeezing the milk jug pushes air into the top of the carboy and forces the beer up the racking tube.

In theory this is like using CO_2 to force the air into the carboy, but it's a lot safer.

Carl Royer
Calais, Maine

Homebrew Web Sites

Dear BYO,

Here's another "virtual brewery" to add to your list of good homebrew sites: pw2.netcom.com/~erikvan/brewery.html. This site includes a lot of links and a pretty good amount of information, not to mention Guinness and Newcastle screen-saver software.

Rob Wolf
Dayton, Ohio

Dear BYO,

Reading through your list of Web sites in "Surfing for Homebrew" (October '97 BYO), I thought I would share one site I check out frequently. This site has some really good information, recipes, free and paid-for software (downloadable), and links to other brew pages.

Check it out for yourself at www.beerinfo.com.

Juan R. Cuellar
Sacramento, Calif.

Dear BYO,

I'd like to add one of the best beer sites on the internet to your list.

My favorite is The Ultimate Internet Beer Guide at www.beer.mecca-net.com.

Mia Smith
Tucson, Ariz.

Black and Tan

Dear BYO,

I plan on brewing a batch of black and tan. Could you give me some idea of the ratio of porter to ale I should use?

Ralph Van Wormer
Portland, Ore.

The ratio of porter to pale beer is subject to personal preference. But it is typically between one and two parts porter for every one part pale beer.

Black and tans can be made by blending beers after fermentation or can be made by merging recipes before brewing. Both methods work well.

Pump It Up

Dear BYO,

I am a graduate student at University of California at Davis studying fermentation science. I would like to find out about pumps that can be used to move five- and 10-gallon brews. I want to get the sparge water kettle down on the ground and not have to depend upon gravity when sparging.

Can you help me out?

Darren C. Procsal
Davis, Calif.

There are many good pumps suitable for use in homebrewing. Styles include submersible, centrifugal, and peristaltic pumps. A peristaltic pump such as Masterflex 7553-50 pump drive with a 7021-24 pump head available from Cole-Parmer, a scientific equipment company, might just be right for you. Check out local hardware stores and homebrew retailers for other pumps.

For more information, refer to "Pump It Up," April '97 BYO.

Winterbok for a Chilly Night

by Scott R. Russell

Okay, so the last couple of months I got, well, carried away, I guess. I've been told I get extravagant when I'm excited about something, that I don't listen to reason, that I rant and rave...Oh, umm, where was I?

So I have to prove a point in this month's column. That I can restrain my creativity a bit, that I can create a simple recipe. A simple, balanced beer that still adheres to the ethics and aesthetics of brewing off the wall. And so I shall.

Where I grew up, in central Massachusetts, forest floors were covered with wintergreen. They may still be, for all I know, but now I live in Vermont and wintergreen just doesn't seem to work here. I've tried to transplant it, tried to buy nursery stock and naturalize it, but to no avail. Luckily, I can get dried wintergreen from my homebrew supply shop. Many herb and tea shops also carry it. So I can get that flavor when I crave it, which I do fairly often. Yes, I'll admit it, I used to stand in front of a mirror in the dark and crunch wintergreen Life Savers to watch the sparks. And remember those not-quite-hard, not-quite-soft pink candies, the size of a small stack of quarters (or, it just occurred to me, a hop plug)? They were my favorite as a kid, and I still buy them from time to time. That same flavor came through in the birch beer we sometimes bought at the local hamburger stand or in the clubhouse at the golf course.

I've tried several recipes for beers with wintergreen as a spice, including a dunkelweizen and a red ale, both of which were nice. The best by far, though, was a bock. A somewhat stronger than average bock, dark and rich, with burnt sugar and roasted grain notes, mild hops offset by the

Winterbok
(5 gallons, extract and specialty grain)

Ingredients:

- 4 lbs. dark Munich malt, 10° Lovibond
- 1 lb. cara-pils malt
- 0.5 lb. chocolate malt
- 0.5 lb. medium crystal malt, 60° Lovibond
- 3 lbs. light unhopped dry malt extract
- 3 lbs. amber unhopped dry malt extract
- 4 oz. malto-dextrin powder
- 1.5 oz. Hallertauer hops (4% alpha acid), 0.25 oz. for 60 min., 0.5 oz. for 30 min., 0.75 oz. dry hopped for 30 min.
- 2 oz. dried wintergreen leaves
- Lager yeast slurry (Wyeast 2308 Munich Lager or the like)
- 1 oz. baker's wintergreen extract (optional)
- 2/3 cup corn sugar for priming

Step by Step:

Heat 7 qt. of water to 169° F. Crack grains and mix into water. Mash should settle to 157° F. Hold 75 min., run off, and sparge with 3 gal. of water at 168° F.

To kettle add extracts and malto-dextrin powder. Bring to boil, add 0.25 oz. of hops. Boil 30 min. Add 0.5 oz. of hops and boil another 30 min. Add remaining hops and wintergreen leaves and remove from heat. Total boil is 60 min. Steep for 30 min., then chill and add to fermenter along with enough pre-boiled cold water to make 5.25 gal. At 65° F, pitch yeast (pitch big; this needs a clean taste, no DMS or similar off-flavors are allowed).

Ferment at 65° F for two days. Gradually cool to 55° F for 10 to 12 days. Rack to secondary and lager at 38° to 40° F for six to eight weeks. Prime with corn sugar, and add wintergreen extract if desired. Age in bottles (or keg) at least six weeks, then select a cold, miserable winter night and pop one open. It'll make you think of a late spring or early summer evening.

Brewing Notes:

All-grain brewers: Substitute for the dry malt extract 8 lbs. lager malt, increase the crystal malt to 1 lb. Mash at the same temperature and for the same time but use 3.75 gal. mash water and sparge with 4.5 gal. Your boil should be timed to reduce the wort down to 5.25 gal. Use the same hop schedule as above.

All-extract brewers: Steep the cara-pils, crystal, and chocolate (amounts as above) in 3 gal. of cold water, heat gradually to 170° F, then remove grains. Increase the dry malt extract to 5 lbs. light and 4 lbs. amber.

One interesting variation I tried a couple years ago was to add a jar of root beer soda extract at bottling. It might work with sarsaparilla or birch beer extract as well.

cool, smooth bite of wintergreen. A bock meant to be brewed in and for cold weather.

Reader Recipes

Classic English Pale Ale

(5 gallons, extract and specialty grains)

The original pale ale. A copper beer with medium body and great balance. A Bass ale clone.

Julian Bencomo
Bencomo's Homebrew Supply
Fresno, Calif.

Ingredients:

- 7 lbs. light dry malt extract or 8 lbs. liquid extract
- 0.5 lb. caramel malt, 40° Lovibond
- 0.5 lb. caramel malt, 10° Lovibond
- 2 oz. Fuggle hops (1.5% alpha acid), 1.5 oz. for 90 min., 0.5 oz. for 10 min.
- 1.5 oz. Kent Goldings hops (6.8% alpha acid), 0.5 oz. for 10 min., 1 oz. for dry hopping
- 1 tsp. Irish moss
- 1 tsp. gypsum
- Wyeast 1028 (London ale) or Whitbread dry yeast
- 5 oz. corn sugar for priming

Step by Step:

Add gypsum to 3 gal. of cold water. Steep grains at 156° F for 45 min. Remove grains and top up to 5 gal. Bring to a boil, remove from heat, and add malt extract. Return to the heat. When it comes to a boil, add 1.5 oz. of Fuggle hops and boil for 70 min. Add Irish moss and boil 10 min. more. Add 0.5 oz. each of Fuggle and Kent Goldings hops and boil 10 min. more. Total boil is 90 min. At end of boil add 1 oz. of Kent Goldings. Chill and pitch yeast.

Ferment at 68° F for one week. Transfer to secondary for two weeks. Prime with corn sugar and bottle.

OG = 1.050-1.058
FG = 1.012-1.020

Russian Imperial Stout

(5 gallons, partial mash)

Although this beer is a heavy, stronger stout, the flavor is so excellent it is smooth going down. Slight chocolate flavor and great tasting.

Ed Megela
Brewer's Corner
Scranton, Pa.

Ingredients:

- 6.6 lbs. Northwestern amber extract
- 3.3 lbs. Munton's light malt extract
- 1 lb. crystal malt, 60° Lovibond
- 0.25 lb. roasted, unmalted black barley
- 0.25 lb. black patent malt
- 2 oz. Eroica hops (20% alpha acid), for 60 min.
- 0.5 oz. Cascade hops (4.1% alpha acid), for 10 min.
- Wyeast liquid 1084 (Irish ale)
- 3/4 cup corn sugar for priming

Step by Step:

Crush and steep grains in 3 qt. water at 155° to 160° F for 30 min. Remove grains, adjust volume to 5.5 gal., and add malt extract and 2 oz. Eroica hops. Boil for 50 min. Add 0.5 oz. Cascade hops and boil 10 min. more for a total boil of 60 min. Cool

and pitch yeast at 72° F. Ferment for at least six weeks. Prime and bottle.

OG = 1.070
FG = 1.018

Pepperberry Belgian Ale

(5 gallons, extract)

Sounds strange, but the combination tastes great.

Terry White
Brew Fellow's
Buffalo, N.Y.

Ingredients:

- 4.4 lbs. Ironmaster Belgian ale kit
- 1.4 lbs. Alexander's pale malt kicker
- 2 lbs. frozen strawberries
- 2 lbs. honey
- 1 Tbsp. black peppercorns (roughly crushed)
- Ale yeast (such as Wyeast 1214 Abby Ale)
- 3/4 cup corn sugar

Step by Step:

Boil extracts for 30 min. Mix strawberries and black pepper. Turn off heat, add strawberries and pepper, and steep 20 min. Cool to 80° F and pitch yeast.

Ferment in primary for about five days. When primary is finished (kraeusen falls), rack to secondary. Bottle when fermentation is complete and beer is clear. Prime with corn sugar and bottle.

Mild Ale

(5 gallons, extract and specialty grains)

This is a mild ale based on Arkell's Mash Tun Mild from *Brew Your Own Real Ale at Home*, a book by Wheeler and Protz. It is simple and good.

Dan Listermann
Listermann Mfg. Co. Inc.
Cincinnati, Ohio

Ingredients:

- 4 lbs. Superbrau plain light malt extract
- 2 lbs. crystal malt, 50° Lovibond
- 1 oz. Fuggle hops (4% alpha acid), for 60 min.
- Edme dry yeast
- 3/4 cup corn sugar for priming

Step by Step:

Divide the crushed malt between two muslin bags and steep in 1.5 gal. of 160° F water for 20 min. Remove the bags and add the extract and hops. Boil 60 min. Cool the pot to 100° F, pour wort into the fermenter, and top up to 5 gal. Pitch the yeast at 70° F and stir vigorously to aerate.

Ferment for one week. Prime and bottle. ■

Share Your Recipe!

We want your recipe for Recipe Exchange! If we print it, we'll send you a spectacular *Brew Your Own* T-shirt! Send your favorite recipe to Recipe Exchange, c/o *Brew Your Own*, 216 F Street, Suite 160, Davis, CA 95616. Or send e-mail to edit@byo.com. Be sure to include your address and phone number.

Foaming at the Hops

Mr. Wizard

I recently finished brewing a pale ale that has a peculiar first taste. The head of the beer has a very strong, bitter taste like concentrated hops. It was so unpalatable I almost threw out the whole batch. Fortunately, I waited a few minutes for the head to recede and resampled the beer. Lo and behold, a beautiful, hoppy pale ale was born.

Although now I know and can warn my friends not to drink the brew until after the head subsides, what causes the phenomenon and what can I do to prevent it?

Jeffrey Gold
Bronx, N.Y.

What you have discovered is that hop bittering acids are concentrated in beer foam! This is the same empirical evidence that led brewing scientists of the last century to hypothesize that hops are related to beer foam stability. More than a century later scientists are still studying the effects of hops on beer foam.

Your problem involves something that I usually don't address and that is the issue of beer recipes. Simply stated, you have over-hopped your beer. Beer is one of very few beverages intended to maintain a persistent foam, and the foam on beer adds to the overall sensory experience. If a beer's foam is too bitter to drink and must collapse before consumption, the beer drinker is denied one of the pleasures of the malt tipple.

Somehow, American brewers have convinced consumers that a beer with no foam is normal and that foam is the stuff occupying precious container space intended for more beer. Coors even has a commercial poking fun at the foam on microbrews. I suppose this is understandable considering any foam on a Coors Light fades so quickly that one would assume he was being served a low-fill.

All-malt beers should have a stable foam and the hopping should be designed for a pleasant-tasting beer including its foam. In my opinion an excellent beer is a balanced beer. If the beer is intended to be light in flavor, then a balance of subtleties is in order. If the beer is intended to knock the socks off the drinker, then it should do so with overwhelming resound, not just one attribute. Kind of like Tchaikovsky's "1812 Overture."

An excellent beer should taste excellent when served properly. A properly served beer is cool enough to refresh the palate but warm enough to smell. Beer should always be evaluated from a glass to best release the beer's aroma qualities. Finally, a properly poured beer should have a foam that adds to the sensory experience. Kind of makes me wonder why ice-cold beer slurped out of a can tastes so damn good after mowing the lawn!

Mr. Wizard

I almost had a heart attack when I realized that I had forgotten to activate the liquid yeast for tonight's brewing. (It takes about a day to activate.) I almost panicked. I remembered about the yeast after all my equipment was taken out and sitting in the tub sanitizing in bleach. I had just finished steeping my grains and was just starting to boil my malt when it hit me. I shut the heat off and thought about it. I decided to proceed with everything as usual until I was ready to pitch the yeast. I then put the unpitched wort (closed fermentation) in the refrigerator downstairs. When the yeast is ready, I will allow the wort to get back to room temperature and then pitch the yeast.

Is there anything I should have done differently? Will there be any adverse side effects?

John DiCosimo
New Britain, Conn.

This story rings true for the many food processes requiring life. Baking, cheese making, pickling, wine making, brewing, and many more processes all require a vital innoculum of microorganisms to work. Some food fermentations are "wild" in that the bugs doing the work come with the ingredients and don't have to be added. Pickles, sauerkraut, and many wines and breads are products of wild fermentations.

Beer, on the other hand, is almost always the product of a controlled fermentation using a specified strain of yeast, and brewers have become some of the most able keepers of large quantities of yeast in the food processing world. However, even the most skilled brewer has prepared to cool wort only to discover the sudden absence of the yeast! What's a brewer supposed to do?

In a commercial brewery yeast can almost always be scrounged from another fermentation, but the homebrewer is in a different situation. In your case you did what you had to and the approach was logical. By cooling the wort and storing it at a cold temperature, you reduced the risk of any bacteria multiplying and spoiling the wort. As long as you practiced good sanitation, this method should work. Since bacteria are almost

always present somewhere in cooled wort, the wort will start to spoil with time, but the cold temperatures will definitely greatly slow this process.

Some brewers may argue that pitching the yeast you had at the time would have been better than waiting for it to multiply. If your pitching yeast has any bacteria at all, this method could cause serious problems since bacteria multiply much faster than yeast. Another option would have been to round up some quality dried yeast for this batch.

What should you have done differently? Obviously, yeast is a key consideration when deciding to brew and checking your yeast supply before brewing is always advised.

I have always been very impressed with the yeast management programs of some of the major domestic brewers. Imagine brewing more than 20 brews per day with each brew requiring several hundred gallons of healthy, clean, thick yeast.

This may seem easy since commercial brewers all re-use yeast, but they don't re-use it forever. Most lager brewers will use yeast for about seven generations before discarding it. This means that they are constantly working with yeast in the lab and propagating yeast in very large quantities.

Yeast management is the common link connecting all brewers and never becomes easy.

Mr. Wizard

In the November '97 issue of BYO, Jim McHenry asked Mr. Wizard about low yields from his mash. Jim suspected poor mash-temperature control was the culprit. He was using what sounded like a standard homebrewer's thermometer.

I eagerly read Mr. Wizard's answer because I had a similar problem using similar equipment five years ago when I went all-grain. It pains me to say it, oh Master of Mash, but you let Jim and me down. Although you were absolutely right with the information you gave Jim, you didn't really answer his question.

I had trouble with temperature control, too. Experience taught me that patience is indeed a virtue when mashing. I give my thermometer 10 minutes before I decide to read it.

If Jim is using a pot for a mash tun that he heats on the stove, my advice is to heat his mash water to 165° F, put the lid on, and take the pot off the stove. Wait a few minutes (five is good, 10 is better with a slow thermometer) and take a reading. If the temperature is still 165° to 167° F, you can mash in with room-temperature grist.

My average temperature drop at mash-in with 100-plus mashes is 10° to 15° F. This puts me firmly in the 150° to 155° F bracket for my mash. You have to trust me on this one, Jim; it really works. Stir just enough to ensure no dry spots and don't look at your thermometer for 10 minutes. Leave the lid on and wrap the pot in a blanket to keep it cozy.

This will probably take care of Jim's temperature anxiety. I hope this information helps and that I haven't offended the Emir of Enzyme.

Tom Bechard
Rouses Point, N.Y.

Thank you for the added information. Your advice to remove the mash pot from the stove is sound because a hot burner will continue to heat the mash long after the heat is shut off. This would certainly explain a mash that is hotter than expected.

A problem I have encountered with thermometers but failed to include in my original answer to this question is calibration. Some thermometers, especially dial thermometers, can be significantly out of calibration. The best way to check a thermometer is to measure the temperature of melting ice and boiling water. These temperatures should be 32° F or 0° C and 212° F or 100° C, respectively.

Because the boiling point of water is dependent on atmospheric pressure, high- and low-pressure weather systems will cause slight fluctuations in the boiling point. In any case, I have encountered many out-of-calibration thermometers that were the source of error, especially wort-fermentability problems, from seemingly normal mashes.

Mr. Wizard

I have one soda keg that has produced three batches in a row of different beer recipes with an iodine or other strong chemical taste. My other keg has never had a bad batch. The beer smelled fine prior to kegging. Is iodine or strong chemical taste a common off-flavor for beer? Is it something in the keg?

T. Shelburne
Madison, Wis.

Chemical off-flavors are frequently encountered in beer and can be caused by numerous factors. The most obvious cause comes from traces of cleaning or sanitizing chemicals left on equipment surfaces after use. Chemicals containing chlorine and iodine are well known contributors of chemical off-flavors if the compounds remain on the equipment. Of the two, chlorine is the worst because it can combine with malt phenols to form a class of compounds called chlorophenols, which have a pronounced medicinal aroma. Iodine sanitizers usually cause no problems if used at their recommended concentration.

Some brewers encounter problems with chlorine even without using chlorinated sanitizers. These problems are often traced to chlorinated tap water. If brewers use chlorinated tap water for rinsing brewing equipment, then chlorophenol off-flavors may arise. One well known craft brewer had a problem with chlorophenols in his fruit beer that was eventually traced to the fruit. The fruit source had been rinsed at the farm with chlorinated water and this chlorine was being introduced to the beer at the time of fruit addition. This problem took some good detective work to solve.

Medicinal aromas can also come from wild yeast contamination. In fact the classic indicator of wild yeast contamination in beer is a distinct phenolic aroma. This aroma is often likened to cloves or the smell of standard bandages.

These are all possible explanations to your problem, but I don't think they are the real culprit. All of your beers from all kegs would taste off if it were due to your chemical selection or city water, and wild yeast attacks probably would not be limited to one keg, although that is certainly possible.

I think the most probable cause of the off-flavor is leftover flavors in the keg gaskets. I think you have an old root beer keg on your hands, and the aroma in beer is not iodine or medicinal but root beer.

The most notable aromas in root beer are phenolic by nature and do smell somewhat medicinal. They are also next to impossible to completely remove from rubber gaskets they contact. Many a pub brewer will tell awful stories of contaminating beer lines, gaskets, hoses, and beer fillers with root beer where the only solution was to replace all soft parts. This can be expensive in a commercial brewery! The lesson for them is to keep their root beer away from everything else. In your case you inherited the taint, but the solution is the same.

Take your suspect keg apart and remove all rubber O-rings and gaskets and replace them. Most homebrew stores selling kegs and kegging equipment will carry or have the ability to order replacement parts. Even if the problem is not from root beer, your problem is most likely associated with the keg's previous resident!

Mr. Wizard

I read "Build a Beer Engine" (May '97 BYO). I procrastinated all summer but am now going to build one. I was talking to my local homebrew retailer and learned that a CO_2 system is often used in conjunction with a beer engine to provide blanket pressure, which will prevent the carbonation from moving out of the beer and into the headspace as the keg is emptied.

I understand the concept, but what I want to know is: How long does it take?

I was referred to CAMRA's (Britain's Campaign For Real Ale) book regarding cellarmanship, but it says that flat beer due to CO_2 equalization rarely occurs unless the turnover rate for the beer is extremely slow. What is slow? The CO_2 sounds like a foolproof solution, but I really don't want to incur that extra expense. I generally consume a five-gallon batch in about three or four weeks. Will I have flat beer?

Les Mailer
Modesto, Calif.

The information you got from your local homebrew shop is correct. If beer in a keg is exposed to the atmosphere, the carbon dioxide in solution will migrate out of the beer and equilibrate with the partial pressure of atmospheric carbon dioxide.

The question comes down to the definition of "flat beer." If the beer is stored cool, say 55° F, with no top

pressure, it will contain approximately 1.55 volumes of carbon dioxide. If the temperature of the beer is increased, the carbon dioxide level will drop even lower. To put this level into perspective, most American beers contain between 2.5 and 2.8 volumes of carbon dioxide.

Beer with 1.55 volumes of carbon dioxide would be considered totally and unarguably flat by the vast majority of American, German, Japanese, Brazilian, Australian, South African, Mexican, Canadian, and Bahamian beer drinkers, just to name a few. However, if you take that same beer, squirt it through a sparkler attached to a beer engine, and place it in the hands of most anyone from the United Kingdom, it would be considered perfectly normal.

If your goal is to homebrew a nice ale and serve it from a beer engine in a traditional manner, then the CAMRA cellarman's guide is absolutely correct. Since the English drink beer qualifying as flat, it takes a very long time indeed for it to get any flatter.

In all seriousness, cask ales usually contain roughly 1.5 volumes of carbon dioxide and are stored near cellar temperature (55° F) so they are already more or less in equilibrium with atmospheric conditions. Some cask ales contain a little more carbon dioxide, somewhere between 1.55 and 2, and will lose the little carbonation they have with time.

The concern many have with the CAMRA guidelines of leaving the cask vented to the atmosphere for prolonged periods is beer oxidation. This not only begins to change the beer's flavor, which some people like in a cask ale, but the oxygen allows for the growth of aerobic beer spoilage organisms. These bugs only grow in oxygen-containing environments and are not a problem for beers dispensed with carbon dioxide.

However, cask beers can and do spoil due to aerobic bugs. The most notable example is spoilage from *Acetobacter species*, which convert ethanol in beer to acetic acid (vinegar). A slight over-pressure of carbon dioxide or a mixture of carbon dioxide and nitrogen will prevent the problems associated with oxygen in the headspace of your keg. Care must be taken not to use too much pressure as the beer will over-carbonate just as it will lose its carbonation. ■

Mr. Wizard's Address

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

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

The Spice of Life

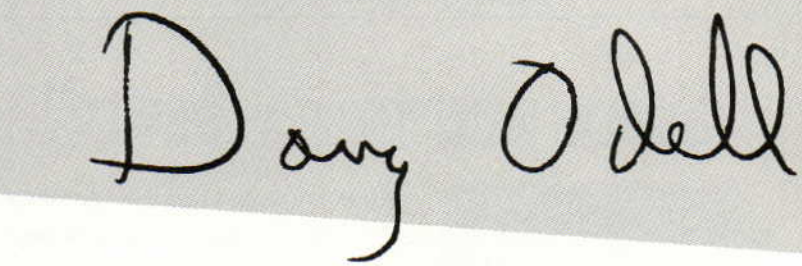
by Suzanne Berens

Odell Brewing Co.

Brewer: Doug Odell
Brewery: Odell Brewing Co., Ft. Collins, Colo.
Years of experience: Eight
Education: BS in Geology from California State University at Sonoma; extension courses on brewing at University of California, Davis
House Beers: 90 Shilling (Scottish and pale ale), Easy Street Wheat, Cut-Throat Porter (golden ale)

"You wouldn't ruin a beer by underspicing it, but you would by overspicing. Be modest."

Brewer: Doug Odell



We make a holiday ale, which has cinnamon, nutmeg, cardamom, ginger, rosehips, and fennel. We use about three times as much nutmeg and cinnamon as the ginger, rosehips, and fennel, and even less cardamom. I wanted to come up with a unique flavor in which you really had a hard time picking out any one individual flavor that dominated the others. The finished product is a little bit like pumpkin pie.

The first step you must take, no matter what you want to brew, is to experiment. Less is better. I've had beers that were way overspiced. We don't use cloves because I find them overwhelming. If you do use cloves, keep in mind a little goes a long way. The same is true for some other spices, so try different proportions.

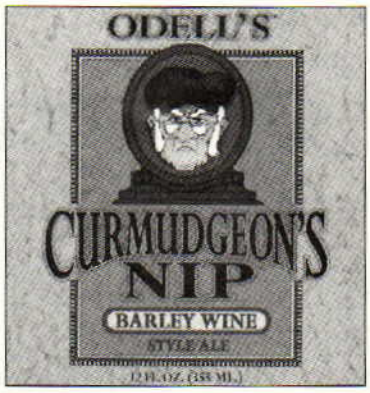
The next step is to conduct a test. I did a couple of five-gallon test batches. I picked the spices for the holiday beer out of the air, figuring they were good for the holidays and for winter in general. A lot of these spices are used in pumpkin pie. I made a water tea and tried to figure out what the relative strength of these spices was. The first one I made I overdid it with the cardamom. It is very potent. So I dropped that way back; it is now the smallest amount used of all the spices. It's about two-thirds the amount of the ginger, rosehips, and fennel.

After a couple of batches, I came up with the right proportions. Even after you decide on a recipe, keep experimenting. We have changed the recipe over the years. The last ones were too spicy. We have dropped back the proportion of spices 10 to 15 percent over several batches.

Before deciding on a recipe, know the difference in flavor between dried and fresh spices. Not all spices taste

The Tips

- **Add the spices according to their strength. It's harder to extract flavor from some spices, so these must be boiled longer.**
- **Experiment. Less is better. You can ruin a beer by overspicing it.**
- **Don't assume you can simply convert dried to fresh spices. Some spices can taste different in different forms.**
- **Adjust your hops according to your spices so that both come through without overwhelming each other.**



the same dried as they do fresh. We use all dried spices for our holiday ale. We could use fresh ginger, but it would probably change the flavor. Fresh reminds me of Asian cooking whereas powdered makes me think of ginger snaps or ginger bread. If you are using fresh spices, add them to the pot a little sooner.

Once you have a ratio you like, consider how this will work with your hop schedule. If you are using three ounces of finishing hops in a five-gallon batch of ale, that's enough to give flavor and aroma. So when you add spices, you might want to drop the hops back to one ounce. That way you still get the hop character without overwhelming the spices.

Timing is important. We put the spices in 30 seconds before the end of the boil. I think if we put them in any sooner, we might blow off the volatiles and lose some aroma. If you have a spice or something that takes long to extract flavor from, such as orange peel, you might want to keep it in a little longer. Some people make chili beers. They'll usually throw those (chilis) into the fermenter instead of the hot wort to retain the chili aroma.

One aspect to watch for in brewing spice beer is that spices change in potency from year to year. With hops the supplier will tell you what the alpha acid is. But there is no such analysis for spices. So you have to hope it hasn't changed too much. Always keep some of the spices you used around so you can compare them with newer ones. Make a little tea and keep notes from one year to the next or one batch to the next. See how one teaspoon in a quart of wort boiled for one minute tastes, and go from there. ■

The Bitter Truth About an English Beer

by Alex Fodor

Although the British are renown for their strange sense of humor, there is one subject that Monty Python rarely jokes about. Beer. Even the English word for a casual drink has a serious connotation. They call it a "session." If having a session is a national pastime, then the hop-dominated bitter is most certainly the national drink.

It may offend some to say that the British are bitter people, but it is undeniably true. Practically every brewery features a bitter and many have multiple versions. It is not unlikely that a given brewery will offer an ordinary bitter, a best bitter, and an extra special bitter. Why so many bitters? Aren't they all basically pale ales? This is true. But producing many types of pale ale is no stranger than a large American brewery making eight versions of American lager.

In general bitter is a cask conditioned real ale served on draft at cellar temperatures of 50° to 55° F. Ordinary bitter, the most quaffable of the session beers, has an original gravity between 1.035 and 1.038 and a bitterness of 20 to 35 IBU. The alcohol content falls near 2.9 percent by weight or 3.6 percent by volume.

The styles of best bitter and extra special bitter are too close to be defined independently even though a brewery may offer them as distinctly different beers. They can be lumped into the category of special bitters. Special bitters have a starting gravity in the range of 1.038 to 1.045 and an IBU of 28 to 46. The alcohol approaches 3.8 percent by weight and 4.8 percent by volume.

Any beer called bitter should live up to its name. This is not a drink for those who identify with bitter beer face. Because little else stands in the way of its expression, the hop flavor in ordinary bitter dominates the taste profile. As with any other beer, however, a great deal of variation exists within this category. In some versions of the brew, a late hop or dry hop note complements the bitterness. However, the bulk of the bitterness should come from kettle hops that are boiled for 45 minutes to an hour. Fresh hops are mandatory. The hops should be green, not pale yellow. When opening the bag, an intense floral aroma should strike the brewer. The hops should not be odorless or cheesy smelling. Look for hops packaged in nitrogen-flushed and vacuum-sealed bags to guarantee freshness.

Traditional English hop varieties make excellent bitters, but most low-alpha aroma hops are worth experimenting with for a late hop addition. The aroma of high-alpha varieties often overwhelms subtler flavors and appears overly harsh in the context of bitter.

In addition to hop aromatics, yeast strain also shapes the flavor of bitter. Fruitiness and slight diacetyl are common side effects of the distinctive ale yeast used. The highly flocculent and intensely fruity London ESB ale yeast, Wyeast 1968, is a favorite. The draft version of bitter should be clear though unfiltered. This can be accomplished by taking advantage of a flocculent yeast strain for the fermentation and adding isinglass or gelatin finings when the priming sugar is added. The low carbonation makes a less-filling brew and allows for more pronounced flavor expression. On the other hand don't expect a frothy head unless you have a beer engine. Add half the normal priming sugar to achieve a carbonation level around 1.5 volumes.

As with all British ales, highly modified English pale malt is the best choice for all-grain or partial-mash versions. A half pound of crystal malt adds a touch of color and flavor to these beers. Slightly more crystal malt suits the profile of the bolder special bitter. However,

keep in mind that the color of ordinary bitter is light to pale amber in the SRM range of eight to 12. Special bitter with an SRM of 12 to 14 may be a slightly darker shade of amber, but not by much. Many British brewers add flaked corn as a mash adjunct or sugar as a kettle adjunct. These tend to lighten the color and body of the beer. You can add flaked barley to create more mouth-feel while maintaining the low alcohol typically associated with bitter.

Burtonizing your water will bring out the dry, sharp hop bitterness associated with the style. This invariably calls for adding a certain amount of calcium sulfate in the form of gypsum.

Although light in alcohol and malt flavor and big in hops like many pilsners, bitter differs in that it has the aromatics of an ale. This is a great advantage to homebrewers since they can still make a hop-bent, thirst-quenching brew in a matter of weeks instead of months.

Plain Bitter (Ordinary Bitter)
(5 gallons, partial mash)

Out of every good brewing session comes many good drinking sessions. Why not brew the refreshing classic yourself? It's just plain bitter.

Ingredients:

- 3 lbs. pale liquid malt extract
- 2 lbs. pale dry malt extract
- 0.5 lb. British crystal malt, 60° Lovibond
- 0.7 oz. Bullion hops (10% alpha acid), for 60 min.
- 2 oz. Cascade hops (5% alpha acid), 1 oz. for 10 min., 1 oz. at end of boil
- Wyeast 1968 (Special London) or other attenuative ale yeast
- Isinglass or gelatin
- 1/3 to 1/2 cup corn sugar for priming

Step by Step:

Immerse crushed grains in 2 gal. of water at 155° F for 30 min. Strain out grains and rinse with 2 gal. of 165° F water to make a total volume of 4 gal. As the wort approaches boil, add malt extracts while stirring to dissolve. Add Bullion hops as soon as boil starts. Boil 50 min. more and add 1 oz. Cascade hops. Boil 10 min. more for a total boil of 60 min. Add 1 oz. more Cascade hops as the boil ends. Cool and aerate. Pitch yeast at 75° F.

Ferment at 60° to 65° F until finished. Add 1.5 to 2 gal. cool water to bring volume to 5 gal. in the secondary. Prime in a keg with corn sugar and add isinglass or gelatin, following the instructions on the package. Age for two weeks before drinking.

OG = 1.038
FG = 1.010

Really Bitter (Best Bitter)
(5 gallons, partial mash)

At 28 IBUs it's not just plain bitter, it's really bitter.

Ingredients:

- 3 lbs. English pale ale malt
- 0.5 lb. English crystal malt, 60° Lovibond
- 3 lbs. domestic pale malt syrup
- 0.5 lb. corn sugar
- 11 oz. pale dry malt extract
- 0.75 oz. Galena hops (10% alpha acid), for 60 min.
- 2 oz. Fuggle hops (5% alpha acid), 1 oz. for 10 min., 1 oz. at end of boil
- Wyeast 1968 (Special London) or other attenuative ale yeast
- Isinglass or gelatin
- 1/3 to 1/2 cup corn sugar for priming

Step by Step:

Mash grains into 1.5 gal. water to hit conversion at 155° F for 60 min. Sparge grains with 168° F water to collect 4 gal. of wort.

Add 2 gal. of water to the wort, making a total of 6 gal. Heat to boil while stirring in malt extract and corn sugar. Boil 30 min. and add Galena hops. Boil 50 min. more and add 1 oz. Fuggle hops. Boil 10 min. more for a total boil of 90 min. Add 1 oz. Fuggle hops as the boil ends. Cool and aerate. Pitch yeast at 75° F.

Ferment at 60° to 65° F. Rack off of yeast after fermentation. Prime in a keg with corn sugar and fine with isinglass or gelatin, following the instructions on the package. Age for two weeks before consuming.

OG = 1.044
FG = 1.010

Darn bitter (ESB)

(5 gallons, all-grain)

At 35 IBUs this brew is darn bitter.

Ingredients:

- 6.8 lbs. English pale ale malt
- 0.5 lb. British crystal malt, 60° Lovibond
- 1 lb. flaked maize
- 1 oz. Bullion hops (10% alpha acid), for 60 min.
- 2 oz. Kent Goldings hops (5% alpha acid), 1 oz. for 10 min., 1 oz. at end of boil
- 1 oz. Willamette hops (4.8% alpha acid), at end of boil
- Wyeast 1968 (Special London) or other attenuative ale yeast
- Isinglass or gelatin
- 1/3 to 1/2 cup corn sugar for priming

Step by Step:

Mash grains into 2.5 gal. of water to reach a conversion temperature of 153° F for 90 min. Sparge with water at 168° F to make 6 gal.

Boil 30 min. and add Bullion hops. Boil 50 min. more and add 1 oz. Kent Goldings. Boil 10 min. more for a total boil of 90 min. At end of boil add 1 oz. Kent Goldings and Willamette hops. Cool and aerate. Pitch yeast at 75° F.

Ferment at 60° to 65° F until finished. Rack off of yeast after fermentation. Prime in a keg with corn sugar and fine with isinglass or gelatin, following instructions on the package. Age for two weeks before consuming.

OG = 1.048
FG = 1.010 ■

TODD HAMMOND

Tune Up Your Equipment

by John Oliver

The old adage about an ounce of prevention certainly holds true when it comes to taking care of brewing equipment. Many problems can be avoided simply by taking a few extra minutes to thoroughly clean everything before you put it away. This may seem difficult when the clock is striking midnight after a long brewing session, but all too often "I'll finish cleaning up in the morning" turns into "I'll clean it the next time I use it." The result is equipment with dried-on stains and deposits that take hours to soak and scrub loose.

Fermenters

If you were careful and took a few extra minutes after your last brewing session to clean all of the residue out of your fermenters before you put

them away, then all you need to do when getting them ready for the new brew is give them a quick visual inspection followed by a thorough rinse and sanitation before use. However, if your last batch was one of those 1 a.m. brewing disasters several months ago and there is a crusty buildup that has dried in place, then you really have your work cut out for you.

Glass carboys require only a quick check for any buildup or deposits that you may have missed during your last cleaning, and then they are usually ready to be sanitized and put to use. If you have any hard water or mineral deposits as the result of water drying in your carboy, they can usually be removed by using any of a number of acidic household deliming agents (such as Lime-Away) that are available at most supermarkets; just be sure to follow the directions carefully and afterward flush thoroughly with plenty of water to remove any traces of the chemical. Do not allow any other types of cleaners or sanitizers to come in contact with these chemicals. A dangerous chemical reaction could result.

Also, check for any cracks in the glass or chips in the neck, even minor ones, and discard carboys that show signs of failing. It may seem expensive to discard a seemingly "good" carboy. But replacing it is cheap compared to the cost and risk of injury when a failed carboy sends broken glass and gallons of what was invariably going to be the best batch of homebrew you

Tips for Plastic

Plastic is relatively inexpensive, lightweight, and durable, making it perfect for many applications in homebrewing. For example a plastic fermenter weighs less than half of what a comparably sized glass fermenter does and is unbreakable as well. However, there are a few special properties of plastic to keep in mind if you choose to use it.

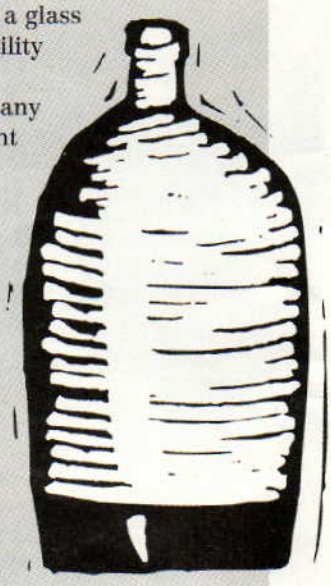
Use only food-grade plastics. Food-grade plastic tends to be slightly more expensive than its non-food-grade-rated counterpart. This is because the plastic in food-grade vessels is designed to be as non-reactive as possible with the food products with which it comes in contact so that a plastic flavor or aroma is not imparted. Using a non-food-grade-plastic vessel or tubing in brewing will most likely not hurt you. But unless you are fond of the flavor of the discount buckets or the aroma of the garden hose you found down at the local home-improvement store, it is probably best to spend a little more for the food-grade stuff.

Do not use abrasives on plastic. Plastic is soft, and even the bristles of a common plastic or nylon dishwashing pad can scratch plastic. The microfine scratches are places for bacteria to hide from sanitizer, multiply, and destroy your next batch of beer. Use only soft dishrags and avoid abrasive cleansers.

Plastic will absorb odors and stains. Because plastic is soft, it will tend to absorb strong odors, flavors, and stains from whatever is stored in it and pass these flavors along to future brews. Needless to say, while your local restaurant will probably be glad to give you all of the food-grade buckets they have, unless you are fond of blue cheese- or pickle-flavored beer it is probably best to avoid them! Likewise, the flavors from any especially strong brew such as a fruit beer or wassail can sink into the plastic.

Excessive use of sanitizers can result in a chlorine or solvent-like iodophor flavor and aroma in the beer. With sanitizers, use only the recommended amount and no more (bleach is one ounce per five gallons water; iodophor is 25 parts per million) and try to keep the contact time within the effective range for the sanitizer being used. Mild staining and aroma are unavoidable over time. When this occurs, try leaving plastic fermenters in bright sunlight for an afternoon. The combination of heat, fresh air, and UV radiation will help to cure out many mild aromas and extend the useful life of the vessel.

Plastic can distort. While one of the good properties of plastic is that it can handle a wide range of temperatures that would shatter or crack a glass carboy, its flexibility also allows it to distort, which many times can prevent the lid from getting a good, airtight seal. In general try to avoid using buckets with "locking" lids that are perforated around the perimeter and are designed to be cut off. They do not seal well. Look for a lid that has a tight, interlocking groove between the lid and the lip of the bucket, preferably with a gasket.



ever made all over the new rug in the closet where you keep your fermenting beer.

Make sure your carboy handles are located on the neck and tightened down properly. If you do not have a carboy handle, consider getting one to help make your brewing sessions a little easier and safer.

Don't forget to look at the bristles on your bottle and carboy brushes to make sure they are still full and in good shape. Many times these simple cleaning tools are overlooked. Brushes wear out and it is virtually impossible to do a good job of cleaning bottles or carboys with a worn brush.

With plastic fermenters, bottling buckets, and any other brewing equipment made of plastic, remember that while these items are usually less expensive initially, they will not last forever. Inspect bottling and fermenting buckets for any scratches that can harbor bacteria. Check the inside lip of the lid to make sure that the gasket that seals the lid shut is intact and in good shape. Snap the lid on your plastic fermenters and place an airlock filled with water on top. When you press down on the center of the lid with your hand, the airlock bubble should move noticeably. If it doesn't, recheck to make sure that the lid seals are in good shape. Remember, if the lid won't seal, the airlock will not be able to prevent air (and possibly bacteria) from entering the fermenter when it is full of beer.

Look for stains and smell the air inside the bucket to see if the plastic has taken on any odors from sanitizer or from previous beers. If there is an unusual aroma present, try a wash of chlorinated TSP and hot water applied with a non-abrasive dishrag, followed by a hot rinse and air drying in the sun. Mild staining and discoloring of plastic is normal with use, but if the aroma persists, replace the vessel. On buckets equipped with a plastic spigot, remove the spigot and check the gasket that seals the spigot to the bucket. The gasket should be in good shape and should not have any cracks that can harbor mold or bacteria, not to mention cause a leak.

Any fermenter, be it glass or plastic, that has dried residue from a previous

fermentation will require a good soaking with plenty of hot water and a strong cleanser. Repeated washings and rinsings may be necessary, and it is imperative not to use any type of abrasive pad or brush on plastic fermenters. (See Tips for Plastic, page 22).

All-Grain Equipment

All-grain brewers should check their mash tuns and false bottoms to make sure that they seal adequately and are free of any deposits or grain buildup that can clog the screen or mesh. If the mash tun has a manifold-style false bottom, disassemble each of the runner tubes and flush them with hot water. A nylon brush of the type used for cleaning rifles and shotguns is helpful to run down each tube to remove any deposits or old grains. Picnic coolers used for mashing will warp and distort; check for any cracks in the inside liner.

Most of the grain mills manufactured today for home use do not require any type of lubrication to the rollers, bearings, or gears. Periodically blow out any grain husks and dust with a quick blast from an air-compressor hose, check all of the adjustment settings to ensure that they are snug, and then run a handful of grain through to see that the roller gap is still within specification by producing a satisfactory grist.

Odds and Ends

Siphon tubing, stoppers, and airlocks are all relatively inexpensive items that can be difficult to clean and maintain for the long term. There are brushes available to help clean out an airlock after a fermenter "blows over," but for the most part these are items that you will want to watch closely and replace regularly. Even storing these items in a bucket of sanitizing solution will eventually result in their acquiring the flavor and aroma of sanitizer, and imparting it into everything with which they come in contact. Rubber stoppers will become discolored, dry out, and eventually begin to crack, leaving places for beer-spoiling bacteria to hide.

Test instruments should be checked regularly to ascertain their accuracy. The standard floating dairy thermometer used by many brewers can be checked by comparing it to another thermometer of known accuracy. On probe-style thermometers check to see that the probe is clean. On digital models check the battery. Stick-on types of thermometers need to be firmly attached to the fermenter to read accurately; check to see that repeated washing cycles have not caused the adhesive to loosen.

Most hydrometers are calibrated to read correctly at 60° F. When immersed in water at this temperature, the hydrometer should read 1.000 (0° Plato).

Most small kitchen scales are equipped with an adjustment knob to set the pointer to read accurately at zero. Any business that uses a scale for retail trade is required to have it certified by state authorities, so checking the accuracy of your home hop or grain scale is as easy as going down to the local homebrew shop and carefully weighing out a measured amount of grain on the certified scale, then comparing the reading to the one you get on your home scale. As with the thermometer, electric models should have their batteries checked and replaced if necessary.

If your instruments don't read satisfactorily, either replace them or note the discrepancy in your brewing log so that you can compensate for any readings made with them.

Wort chillers are among the easiest items to maintain, but since they make contact with the wort after the boil and prior to the pitching of yeast, they are also among the most critical. The immersion-style chiller is virtually

foolproof; all that is required is to rinse off the outside of the coil with hot water after each use and once again before immersing it in the next batch of beer. The oxidation or tarnish that builds up on copper is perfectly normal. While it may look unpleasant, the only danger to your beer comes from dried deposits stuck onto the metal from previous batches.

The care of the counterflow-style chiller is a little more involved and critical, since the wort passes through the chiller, where it is virtually impossible to make a visual inspection to ensure cleanliness. With a counterflow chiller it is imperative to flush the chiller after each use with plenty of hot water to remove any residue or deposits before they have a chance to dry and set, then completely drain the coils to prevent the buildup of mold growth. When you're getting ready to use the chiller the next time, flush the coils with plenty of hot water, and then sanitize.

Bottle cappers — good-quality two-handled or bench-type cappers — can last a lifetime. When you take your equipment out of storage, check all of the pivot points and lubricate them using a light oil or petroleum jelly. Put a thin film of petroleum jelly on the inside of the crimping cup; it extends the life of the cup, crimping the caps requires less effort, and the capped bottles release easier. Remember, a little goes a long way. Too heavy a film could cause the lubricant to squish out and get onto the inside of the cap, potentially ruining the head retention and flavor of the beer inside.

Cornelius-type kegging systems that have not seen service for some time need to be physically dismantled. Each of the kegs, especially if there is any residue inside from a previous batch of beer, should be broken down and cleaned thoroughly. Check and replace all O-rings as needed. Even if they are not leaking, they may have acquired flavors from whatever was in the keg when it was put into storage. Check all hoses and, as with siphon tubing, consider replacing on a regular basis to prevent bacterial contamination or off-flavors.

Ingredients

After brewing only a few batches, most brewers begin to assemble an assortment of extra or leftover ingredients. If you maintain the ingredients as well as equipment, these ingredients can still be good even after an extended storage period, provided they were stored properly to begin with.

Malt extracts, whether in syrup or dry form, will last indefinitely with very few adverse effects. Some darkening of lighter malt extracts is normal with age. Dry malts can

absorb water over time and eventually become rock hard. While this rock is a little more difficult to dissolve into wort, it can be done and the extract used with no negative outcome on the finished beer. The same general rules apply to adjunct syrups or powders, such as corn sugar used for priming.

Grains are much more perishable. The biggest factors affecting grain are moisture content and pests. Long-term storage of grain can result in various bugs and even rodents feasting on the grain supply, and over time the moisture content of the grain will change, resulting in a stale or moldy flavor that will end up in the finished beer. Pale malts are usually more susceptible to this than specialty grains. Any crushed grain that has been stored for more than a few weeks is probably not suitable for use.

Hops vary greatly in their perishability. Pellet hops, when stored in an airtight container under cold conditions such as the refrigerator or freezer, will last months and even years without a perceptible drop in quality. Leaf hops, or any type of hop stored in a plastic bag or opened mylar bag, can become noticeably oxidized and should probably be discarded. Any hops that are unopened and are still in the original vacuum-packed mylar container will probably be unaffected. You can keep leftover hops stored in the refrigerator in airtight, plastic vials.

Yeast performance varies greatly with age and storage conditions. Dry yeast will last for months and even years providing it is stored in the refrigerator. Dry yeast can tolerate storage at room temperatures for short periods of time but will become suspect if it has been stored excessively warm for more than a few weeks. For this reason it is best to always discard the packet of yeast found taped to the top of a can of extract syrup. Liquid yeasts should always be refrigerated. Most liquid cultures are dated. Activating and propagating a starter goes more slowly as yeasts age, but many brewers have used liquid yeasts up to six-months old with no negative impact on the finished beers. Under no circumstances should packets of yeast, dry or liquid, ever be stored in the freezer. This will quickly render them useless.

If you have any one of a number of ingredient kits that include malt extract, specialty grains, hops, and yeast in a packaged form, take a good look at the quality of the packaging when you open the kit. If everything appears to be airtight and sealed, then most likely all of the ingredients are fine, even after several months at room temperature.

Storing ingredients correctly and periodically checking brewing equipment only takes a few minutes. Preserving ingredients saves you money. Maintaining equipment not only can prolong the life of the equipment but also goes a long way toward making the job of sanitation easier.

Hows & Whys of the Wort Chiller

When a bottle of homebrew fills a glass, the first impression of a well-carbonated, brilliantly clear beer fixes a warm smile upon the homebrewer's face. Homebrewers constantly struggle to assure that the bright clarity of the boiling wort transforms time and again into sparkling beer. Quick and proper cooling of the wort after boiling will help the transformation from clear, boiled wort to crystalline, tasty beer.

In addition to aiding clarity, force cooling the wort has two other important benefits: reducing the chance of contamination and reducing the effects of DMS (dimethyl sulfide), which can contribute cooked-corn aromas to beer.

Time Is of the Essence

After the wort temperature falls below 140° F (60° C) and before fermentation activity can be observed (60° to 75° F) marks the most dangerous time in the beer's life cycle because of the high risk of contamination by wild yeast and bacteria. To reduce the risk, the wort should spend as little time as possible in this stage. Force cooling the wort quickly so yeast can be immediately pitched lowers the risk of contamination.

The hot wort must also be quickly cooled to lower the production of DMS and the possible off-flavors it can contribute. Large amounts of DMS are produced during the boil but evaporate into the air with the hot gasses. When boiling stops, so does the removal of

by Douglas E. Fuchs

TODD HAMMOND

DMS. However, DMS continues to be generated in the hot wort. DMS produces an aroma and flavor like sweet canned corn. The longer you wait before cooling and the longer cooling takes, the more DMS will linger in the finished beer.

Clearing the Wort

Controlling break material during the brewing and chilling process is the trick to maintaining consistent clarity in the finished product. Without proper control this material will remain in the beer, creating a chill haze in which the beer appears slightly cloudy when held to the light. Chill haze is formed when protein and tannin molecules break out of solution to form particles that dispel light when viewed. Unless gathered in large, coagulated lumps during the boiling and cooling process so that it can be removed from the wort, this material will remain in the beer.

Almost immediately after the rolling boil begins, you can see the hot break formed as chunky gray matter in the wort. A vigorous, rolling boil is very important at this stage to force protein molecules and tannins to bounce into each other, slowly coagulating and forming the hot break.

The cold break, formed during the cooling process, can be seen as the cloudy plumes of material that waft down to the bottom of the fermenter immediately after transfer. All coagulated material formed during the hot and cold breaks is called trub (pronounced *troob*). If possible, do not transfer trub into the fermenter with the wort.

Force cooling the wort to at least 60° F (15.5° C) maximizes optimum break. The quicker and colder you force cool the beer, the more proteins and tannins are precipitated out of solution into break material.

Homebrewers primarily use three different methods to cool wort: ice bath, immersion chilling, and counterflow chilling. Some homebrewers use a combination of the three for rapid cooling. All three methods use cold water in some fashion, and it is very important to ensure that the water, which has not been sanitized by boiling, never comes in contact with the wort.

Using an immersion chiller with an ice bath speeds up the cooling process.

Ice Bath

Placing your kettle in a tub of ice-filled water is the cheapest and easiest form of chilling. Wort cooling occurs as the sides of the kettle are cooled by the cold water that surrounds it. The water needs to be stirred so that a constant flow of cold water surrounds the hot kettle. Cooling from 210° F (99° C) to 60° F (15.5° C) takes about 1 1/2 hours.

Advantages to using the ice-bath method are that it is inexpensive, it is relatively simple, and it can result in the cleanest bathtub in town.

One drawback to the method is the relative length of cooling time, during which DMS production continues and the risk of contamination is high, compared with the other two methods. With ice baths both the hot and cold break usually end up in the fermenter, which can lead to chill haze from the large amount of trub. These drawbacks compel homebrewers to choose either counterflow or immersion wort chillers because they are more efficient and reliable than the elementary method of ice bath.

Immersion Chilling

Immersion wort chillers are made from 20 to 40 feet of copper tubing coiled in a circle with in and out fittings rising up, resembling two snakes somewhat entwined. A garden hose is attached to the in fitting and another garden or plastic hose to the out fitting. The assembly is placed in the wort and then cold water is run through the chiller.

To maintain sanitary conditions, clean the outside of the chiller with a reliable cleanser, such as trisodium phosphate (TSP), rinse, and immerse the chiller in the just-boiled wort. Placing the twined copper tubing, empty of water, in the boiled wort for 10 minutes will sanitize the chiller.

The in- and out-fitting tubes are

intentionally long at one side so a cover can be secured to the kettle to lower the risk of contamination by airborne contaminants. Stirring the hot wort with the chiller assures that the chiller comes in contact with all the hot wort. Use a hot pad on the out tube, which becomes quite hot.

Cooling from 210° F (99° C) to 60° F (15.5° C) with an immersion chiller takes about an hour. Many homebrewers combine ice bath with immersion to lower the cooling time to 30 minutes.

You can make your own immersion chiller. Check your local homebrew retailer for examples, instructions, or advice. The only things you'll need to purchase are 3/8-inch-outer-diameter copper tubing, two fittings, and enough basic plumbing equipment to bend the copper into coils and attach the fittings. The amount of tubing you need depends on the size of your kettle and on your pocketbook — 40 feet twisted into coils will chill wort faster than 20 feet. Immersion chillers are somewhat inexpensive; the tubing averages $1 per foot at homebrew stores.

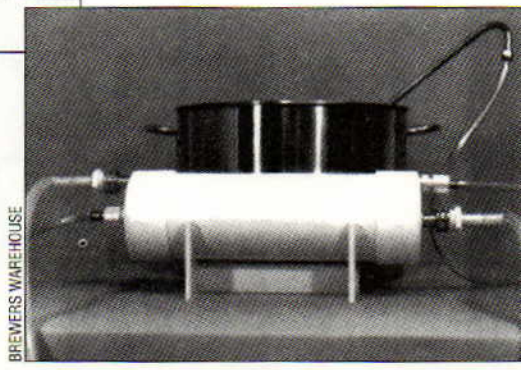
One of the largest advantages of immersion chillers is the simplicity of sanitizing the chiller in the hot wort. Once the wort is cooled and transferred and yeast pitched, cleaning only requires rinsing the outside of the chiller while emptying the tubes of water. Immersion chillers work in kettles with and without a welded gravity line-out to the fermenter.

Drawbacks include the length of time to cool the wort and the difficulty of assuring that most of the hot break will not end up in the fermenter. A line-out (spigot) welded to the bottom of the kettle to gravity feed the cooled wort to the fermenter helps control break material. Stirring the hot wort for about three minutes immediately after the end of the boil will generate a whirlpool that will cause the precipitated break material to settle into an island that should fall just below the line-out.

Counterflow Chilling

Counterflow chillers run hot wort through a coiled copper tube usually lined out from the kettle while cold water runs in the opposite direction within a larger plastic hose surrounding the copper tube. A garden hose attaches to a line-in to force cold water through the plastic hose and around the copper tube containing the wort. A line-out attaches to another garden hose dispensing the water. One end of the copper tube drops the cooled wort into the fermenter.

HEART'S HOMEBREW SUPPLY



BREWERS WAREHOUSE

Using a counterflow chiller allows for rapid force cooling of wort.

Cooling from 210° F (99° C) to 60° F (15.5° C) with a counterflow chiller takes 15 to 20 minutes.

But first, the chiller must be properly cleaned and sanitized for each use. The simplest method involves forcing a gallon of boiling water into the copper tubing with the plastic hose empty of water and letting the water sit in the copper for 15 minutes to effectively sterilize the inner surface of the chiller. To use the chiller turn on the water, fix the line-out end of the copper tube into the fermenter, and cool the wort.

Once the wort is cooled and transferred and the yeast pitched, cleaning requires running another gallon of hot water through the copper tubing. This removes all traces of wort, eliminating the risk that future brews will be contaminated by the chiller.

Mechanically inclined homebrewers can manufacture a counterflow chiller by purchasing a long list of fittings, hoses, copper tubing, plastic tubing, copper end caps, and hose clamps. Some homebrew stores sell kits containing two "T" fittings and four hose clamps. Only copper and plastic tubing are required to complete the assembly. Because the counterflow chiller is the most difficult chiller to manufacture from scratch or with a kit, the mechanically disinclined might consider purchasing one ready to use.

While siphoning hot wort through the chiller into a fermenter is possible, the counterflow method really requires a line-out from the kettle. The whirlpool effect described above will assure that little if any hot-break material enters the fermenter. Because the wort will be rapidly cooled, cold-break material will gather in large clumps at the bottom of the fermenter.

Advantages of the counterflow chiller include rapid force cooling of the wort. For pilsners and light lagers counterflow will bring the wort to optimum pitching temperature fast while limiting DMS production below the taste threshold. Break material is contained and controlled more than with any other chilling method.

Drawbacks include the sanitation issue. Many homebrewers will not use a counterflow chiller because a trace of wort, and possible contamination, could remain behind in the lines after repeated use. The equipment is somewhat difficult to make from scratch and the most expensive when purchased retail, including the added cost of a line-out kettle, which is practically mandatory.

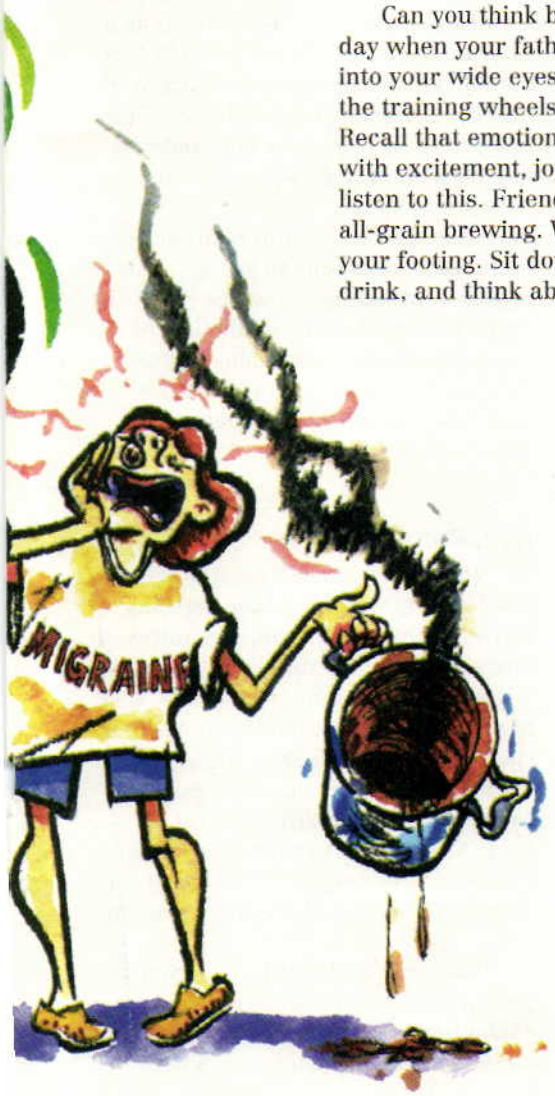

ALI
GRAIN

A STARTER GUIDE TO MASHING

BY ALEX FODOR

Can you think back to that fateful day when your father looked down into your wide eyes and said, "Son, the training wheels are coming off"? Recall that emotional cocktail swirling with excitement, joy, and fear. If not, listen to this. Friend, it is time to start all-grain brewing. Whoa there, regain your footing. Sit down, have a cold drink, and think about it logically.

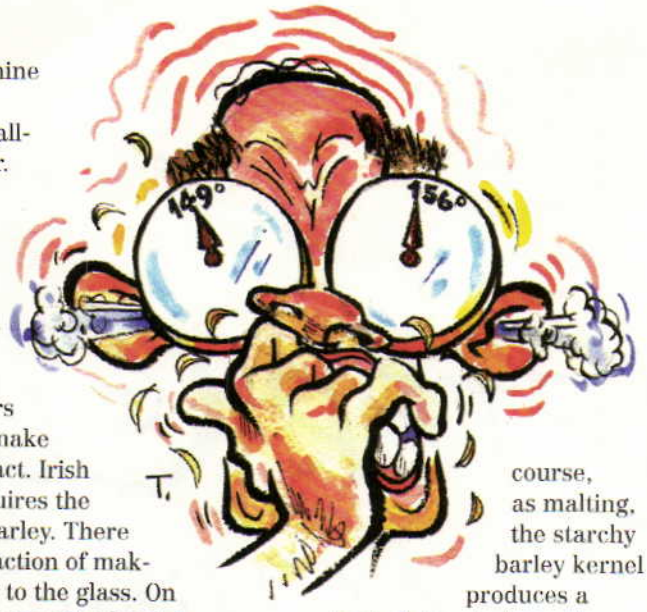
After all, change is a part of life. Imagine if you still rode around on a bike with training wheels. You would look very silly. The same is true with beer. You can imagine that the head brewers of many microbreweries would not take an extract brewery very seriously. This means no offense to defenders of the extract method. But a crusader of the mash tun's true



SHAWN TURNER ILLUSTRATIONS

colors can't help but shine through.

The advantages of all-grain brewing are clear. The control of mash temperature allows the brewer to tweak the final gravity and body of the beer. The mashing of adjuncts and grains means that brewers can make beers that are impossible to make authentically with extract. Irish stout, for example, requires the mashing of unmalted barley. There is also the added satisfaction of making beer from the grain to the glass. On the other hand, you can expect a longer brew day and more opportunities to mess things up.



What exactly is mashing? Mashing is a brewing process that combines crushed malted barley and hot water. Malted barley is a barley seed that has started to germinate and been abruptly stopped. During this process known, of course, as malting, the starchy barley kernel produces a host of starch-degrading enzymes. When a brewer mashes in, he creates the optimum conditions for the enzymes and starch of the malt to react, thereby producing maltose, the main sugar in wort and favorite food of yeast.

For beginning all-grain brewers the easiest mashing technique to learn is the British infusion mash. The goal of the infusion mash is to combine crushed, room-temperature malt (74° F) with water at a much higher temperature (164° F) to reach a temperature in between (149° to 156° F). Once the mash is well mixed, it should be held at the conversion temperature (149° to 156° F) for an hour rest. Further temperature adjustments should not be necessary. Maintaining the conversion temperature during the rest allows the enzymes to fully react with the starch, yielding a suspension of grains, water, and sugar.

When the conversion is over, the goal is to remove the sugary wort from the spent grains. A false-bottomed vessel with a spigot at the bottom makes this possible. During run-off and recirculation, the brewer collects the wort from the mash and sprinkles it back over the top of the grains. The idea is that the grain bed will act as a filter and the run-off will become less cloudy. This doesn't always work well and is not terribly critical for the first few brews. If your wort does not run any clearer after 15 minutes, move on to the next step.

After the run-off and recirculation is complete, it is time to sparge. This involves sprinkling hot water (150° F) over the mash to remove the last of the remaining sugar. After collecting six gallons, boil the wort and treat the batch the same as you would an extract brew.

Equipment

Most likely you will need to update you brewing equipment for mashing. However, infusion mashing requires no fancy, expensive devices.

Kettle: The kettle will be used for heating the mash water, heating the sparge water, and boiling the wort. It should have at least a seven-gallon capacity for making five gallons of beer. A stainless steel pot or a ceramic-coated canning pot with no exposed metal will work well. Avoid aluminum pots.

Mash tun/lauter tun: This should have a five-gallon capacity for a five-gallon batch. The basic structure for an infusion mash tun is a container

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with a lid, such as a bucket, a picnic cooler, or a pot, with a false bottom and a spigot on the side near the bottom. The false bottom can be any straining device that retains the grains and allows liquid to flow through.

A simple, cheap design is a five-gallon bucket with a large, nylon-mesh bag inserted. The bag should be large enough to fill the entire bucket and fold over the top. A spigot is fitted by drilling a hole on the side and screwing in a simple plastic spigot. Rubber gaskets on both sides and a tight fit should keep it from leaking.

Another simple and effective design consists of a picnic cooler fitted with a false bottom. Two popular products sold at many homebrew stores, Phil's Phalse Bottom from Listermann Manufacturing and Easymasher from Jack Schmidling Productions, are preassembled false bottoms.

For the bag-in-a-bucket design, you will need to insulate the mash tun. Sleeping bags work well. Make sure you wrap your mash tun in a plastic garbage bag first or the mash may leak onto your sleeping bag.

Other stuff: You will also need two five-gallon buckets for collecting the wort, a spoon, and a pitcher for pouring the sparge water.

First Mash: Classic Porter

If you are going to use a traditional English mash method, you might as well make a traditional English beer such as porter. The following is a guide to brewing porter by infusion mash for the beginning all-grain brewer.

Charismatic Mega-Porter

Not only does this beer look good, it's big in flavor.

Ingredients:

- 8 lbs. British pale ale malt
- 12 oz. crystal malt, 60° Lovibond
- 12 oz. chocolate malt
- 2 oz. roasted barley
- 0.8 oz. Bullion hops (10% alpha acid), for 60 min.
- 1 oz. Golding hops (5% alpha acid), at end of boil
- Ale yeast (Wyeast 1098 British ale)

Step by Step:

1. Crush the grains. Consider having your grains crushed by your local brew shop, at least for your first few brews. This will save you the cost and hassle of milling. To ensure freshness, have your grains crushed the week of the brew if possible.

2. Prepare the mash water. For your first few batches it may be easier to use purified water that you can purchase in bulk at the grocery store. If you use tap water, you should boil it first and allow it to settle overnight. This will drive off any chlorine and precipitate $CaCO_3$ (calcium carbonate). As you become more advanced, you may choose to request a water report from your local water district and adjust ions based on that report.

3. Calculate the mash water needed. Here's the formula:

Mash H_2O gal. = 0.33 x #lbs. of grain

For this recipe that means:

0.33 x 9.5 lbs.

= Approximately 3 gal. mash water

4. Heat the mash water. Assuming the grains are at room temperature, you want to mash in at 164° F. Since some heat will be lost when the water is transferred from the kettle to the mash tun, heat the water to 168° F over a stove.

5. Mash in. Carefully transfer the water to the mash tun. Cool by stirring with a spoon until the temperature reaches 164° F. Then mix in the grains, making sure any clumps are broken up. As soon as the mash is mixed, cover and insulate your mash tun to maintain the temperature. After 10 minutes, quickly check to see if the mash is in the temperature range of 149° to 156° F. If it is below, you can add hot water to boost up the temperature. If you are above, cool by stirring with the lid open.

6. Hold conversion rest and prepare the sparge water. If the mash is within the temperature range, hold at conversion temperature for an hour. During the last half hour, heat the sparge water to 168° F. Use the same quality of water for the sparge as you did for the mash.

7. Mash out and recirculate wort. When the conversion is finished, a thin layer of sweet, clear liquid will cover the mash. Set your mash tun on a counter and place a bucket below the spigot to collect the run-off. At first the run-off tends to be cloudy. You can help clarify it by recirculating the run-off over the top of the grain bed. Do not let the bed run dry. Keep it wet by constantly recirculating. Do not disturb the bed by pouring the wort directly into it. Hold a spoon over the mash and pour the wort onto the spoon to make the wort flow more gently and evenly over the bed. Don't recirculate for more than 15 minutes even if the run-off does not clarify.

8. Sparge. After you have finished recirculating, begin to collect the wort in buckets. As you sparge, remember to keep a thin layer of water over the grain bed and to apply the water gently and evenly over the mash. Sparge with water at 168° F until a volume of six gallons is collected.

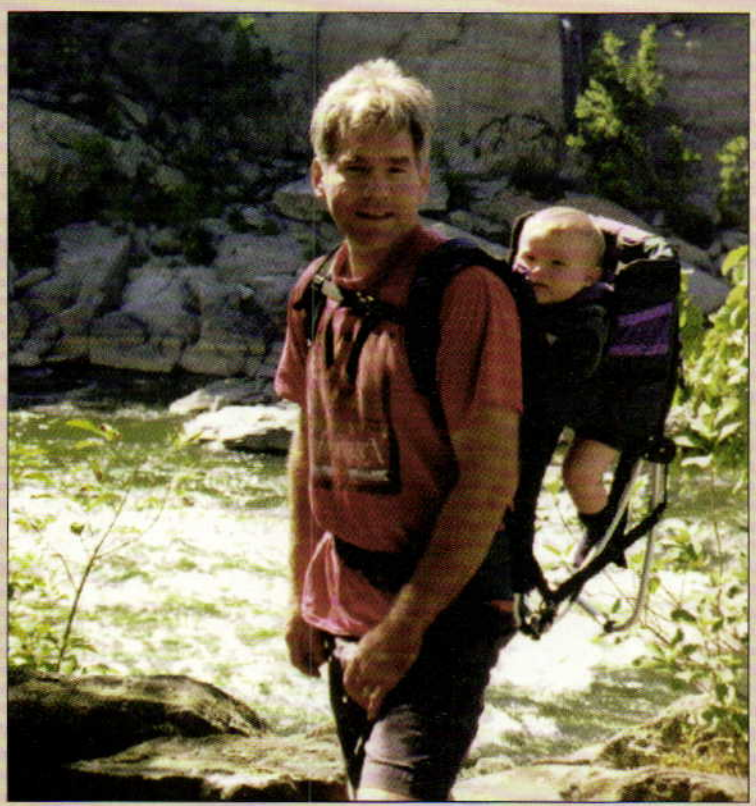
9. Give yourself a pat on the back. Congratulations, you have just completed your first infusion mash.

Treat the rest of the brew as you would an extract beer. Pour all six gallons of wort into the kettle and heat to a boil. Boil for a total of 90 minutes. The first hop addition should be made 60 minutes before the end of the boil. Add the second addition as soon as the boil ends. Cool and aerate. Pitch yeast at 75° F. Ferment at 60° to 65° F. Rack off of yeast after fermentation and age for two weeks before bottling or kegging.

OG = 1.055
FG = 1.013

GOING

These former homebrewers have turned



Rob Mullin went back to basics, trading the frustration of Capitol Hill for the satisfaction of brewing.

by Julie Slama

Every day for six years, Rob Mullin worked alongside some of the most powerful men and women in the country. He sums up the experience with one word: "Frustrating."

As a legislative assistant to Congressman Jamie Clarke (D-N.C.), Mullin was one of the several hundred aides who play a key role in the workings of Congress. They help formulate policy, build coalitions, and to a large extent do the detail work of creating federal legislation.

It's a job many, many people would like to have. Dozens of conservatively dressed suitors seem to roam Capitol Hill constantly, resumes in hand, networking skills polished, in an effort to land such a position.

But for him the job was no dream. He discovered that political change moves by millimeters, not miles. And the two-year reelection cycle is a ticket on the fast train to burnout. When Clarke lost his bid for a fourth term in 1990, Mullin found himself without a job and ready for a career change.

"I had decided I was tired of politics, frustrated by how hard you work without necessarily having anything to show for it. I wanted to do something where I could have something to show for my work."

That something was brewing.

Mullin began homebrewing during the 1988 election. He had received a

PRO!

their hobby into a profession.

homebrewing kit as a gift months earlier, but because of his busy schedule he had set it aside and forgotten about it. He finally pulled it out and dusted it off because he thought it might provide a relaxing change from the stresses of the campaign trail.

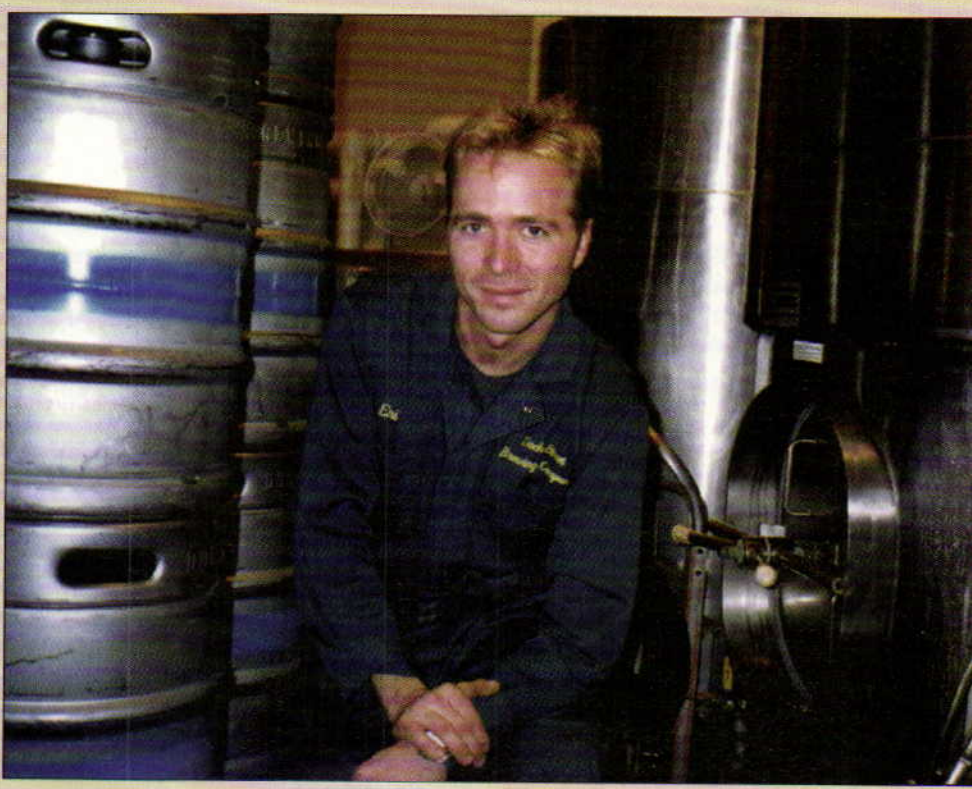
After a quick trip to the local homebrew shop for supplies and instructions — and several subsequent phone calls to the owner for additional information — he completed his first batch, a stout. It turned out well, and he was hooked.

Two and a half years later Mullin, by then a jobless former legislative assistant, met John Mallett, head brewer at Old Dominion Brewery, a microbrewery located in Ashburn, Va. When Mallett offered him a low-paying position as a beginning brewer, Mullin didn't hesitate.

"It was really easy to take a job where I could relax at the end of the day and enjoy what I had worked so hard to produce," he says.

Mullin started as an assistant, as is standard at Old Dominion. By 1995, four years later, he had become head brewer. And this year two of his beers won gold medals at the Great American Beer Festival.

"Anyone who wants to work here starts at the bottom like I did," he says. "Now we tend to hire people to work on the bottling line and they work their



An apprenticeship was the key for Eric Savage, head brewer at Dock Street Brewing Co.

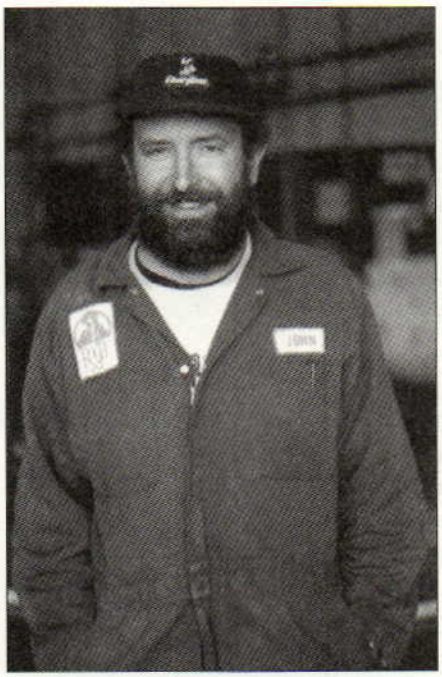
way up from there. The last six people we have turned into full-time brewers and brewer's assistants started on the bottling or kegging line," he says. "A lot of these guys come here looking for work because they are homebrewers. A lot of them find out about the job because they come here to take a tour and we mention that we could use some help. They are here because they enjoy beer."

Mullin prefers hands-on experience to education. "I don't think we would hire someone who has just taken a course to come in here and brew. It's easy to learn how to make beer. The hardest thing is figuring out if doing all the work is what you want to do. There is a big difference between making beer and working in a brewery. There is a lot that has to get done that isn't fun — cleaning and manual work. People don't realize how much work it is. We like to get people in and doing the work to make sure it is what they want to do. Then we'll take the time to invest in educating and training them," he says.

"We get a lot of people in here who want to apprentice for a week. We've never taken anyone on that way. If people are serious about it, they should be willing to give up the job that they're working and work on the bottling line or work throwing kegs around. That's a really tough thing for people to do.

"The other option," he says with a laugh, "is to find a rich uncle and start your own brewery."

Now that Mullin spends more than 40 hours a week brewing, he doesn't homebrew. That's partially, he admits, because he's sure his wife doesn't want to hear any more about beer. If he were to stop brewing professionally, Mullin says, he would definitely start homebrewing again, but with some modifications.



Several of the award-winning beers produced by Rogue Ales Brewmaster John Maier were based on five-gallon homebrew recipes.

An extract brewer before, he would go to all-grain. "I'd use more grain and I'd have a lot more control of the yeast," he says.

"(The yeast) is the biggest difference that I have been able to find between bad homebrew and good professionally brewed beer. The idea of just opening a packet of dry yeast and throwing it in there, you're never going to get the same results as you would from pitching the right quantity of good yeast."

His advice to homebrewers: "Make sure you have good cell counts and good pitching quantities of yeast. The easiest way to do that is to contact your local brewery." Mullin has five or six homebrewers who regularly collect yeast from Old Dominion.

"If (you) have a local brewery that will supply you with yeast, I would highly recommend that. If not, then take the time to grow pitching quantities from the packet of liquid yeast or dry yeast," he says.

Emphasizing the correlation of good materials and a good product is important to Mullin, who worked in a world where the two seemed to be unrelated. Part of his frustration with politics was that "there didn't seem to be a link between the work that you did and the result. People ran bad campaigns and won. Or you could run a good campaign and lose and have nothing to show for it," he says.

"That's one of the best things about brewing, whether at home or professionally, to taste and enjoy what you've done. There are not many jobs where you can do that."

With the recent award of two gold medals at the Great American Beer Festival for Tuppers Hot Pocket Ale in the American-Style Pale Ale category and Dominion Lager, the flagship beer, in the Dortmunder/European-Style Export category, Mullin has more than beer as tangible evidence of his labor.

Award-Winning Homebrewer, Award-Winning Pro

As the first recipient of the Russell Schehrer Award, John Maier has made his mark on the brewing industry. The award, named for the late owner of Wynkoop Brewing Co., recognizes innovation in brewing. Maier, brewmaster at Rogue Ales, was the 1997 recipient of the award, which is presented by the Institute for Brewing Studies.

Maier has helped build an image for Rogue as one of the most creative, bold small breweries in the country. Some of the more unusual beers include Hazelnut Brown Nectar, Mogul (strong ale), and Mexicali Rogue.

One innovation he's introduced is dry hopping his St. Rogue Red Ale in the keg. He also has done considerable work on rauchbiers, the smoke-flavored beers popular in some parts of Germany. Rogue won a gold medal at the Great American Beer Festival for its smoked ale. The silver in the Smoke-Flavored Beers category went to Alaskan Brewing Co.'s Alaskan Smoked Porter, a beer that was originally developed by Maier.

Maier credits much of his success as a professional brewer to his experience as a homebrewer. His technical experience came from instruction and training. "But the artistic influences came from homebrewing," he says. Two recipes he uses at Rogue, the smoked ale and a barleywine, are based on five-gallon recipes he developed as a homebrewer.

In the early 1980s Maier's stepfather gave him a six-pack of microbrewed beers, including a bottle of Anchor Steam. It wasn't long after that Maier signed up for brewing classes at a homebrew shop in Redondo Beach, Calif. His first beers were pretty bad, he recalls, but he learned from his mistakes and slowly improved. When he joined the Maltose Falcons, a homebrew club in Woodland Hills, Calif., his beer really began to improve. He began using cultured yeast and moved to all-grain brewing.

By 1986 he had won a handful of homebrewing awards in state and national competitions. He considered brewing professionally. He quit his job, flew to Chicago, and enrolled in the Siebel Institute, a well known brewing school, for the 1986 fall course.

After completing his training Maier returned to Portland, Ore., where Geoff Larson of Alaskan Brewing Co. hired him as an assistant brewer. While Maier was at Alaskan, he won the American Homebrewers Association's Homebrewer of the Year award. He had saved several bottles of a barleywine that he had made two years earlier, before he started brewing professionally, and submitted them to the 1988 contest.

He stayed with Alaskan until 1989, when he received a call from Jack Joyce, the president of Rogue Brewing. Rogue was preparing to open in Newport, Ore., and Maier was invited to join as head brewer.

"The Larsons at Alaskan taught me a lot about brewing," he says. That is why Maier highly recommends a technical course but in conjunction with some on-the-job training.

"Apprenticeship is a pretty good way to go. I think I would have learned more if I had been in the industry somehow and then went to Siebel. A lot of that stuff was over my head."

Eight years and more than 3,200 brews later, Maier hasn't forgotten his ties to homebrewing. While he hasn't homebrewed since he was with Alaskan, he still spends time with homebrewers, giving them his experimental hops.

He recommends that homebrewers use pure cultured liquid yeast, which first came on the market in the mid-1980s. "That was the biggest advancement in homebrewing ever," he says. "It made the beers a lot better. Homebrewers have access to the same ingredients that we do as professionals. That's why the beers are so good."

Rogue fans will not be surprised by the advice Maier gives to homebrewers. "Don't be restricted by guidelines; you have to brew something that you like to drink," which is presumably how some of Rouge's more unusual

beers originated. "Use lots of specialty grains. Then you can use a lot more hops," he says. "Use lots of hops."

Maier can often be found with members of the Cascade Brewers Society, a group of mostly homebrewers in Portland. He's never far from the hobby that led him to a profession.

Reflecting on his previous job as a senior electronic technician for an aircraft company working on the F14 radar system, he sees no similarities. "Now I'm making an honest living," he says with a chuckle.

Taking the Scenic Route

Waiting tables and tending bar hardly seem the path for an aspiring head brewer. But for Eric Savage this was the only way into the brewhouse at Dock Street Brewing Co., a Philadelphia brewpub.

Once he decided brewing was his calling, Savage talked to a lot of brewers who recommended apprenticing. "They were telling me that people can go to school and come out with some sort of brewing degree and they have good book knowledge but still don't know how to brew. They still don't know how to run a brewery," he says.

Savage faced tough competition when he sought his apprenticeship. "When I got into (brewing), there were only two breweries in our region (Philadelphia) and a lot of people who were trying to get into brewing. I had to compete a lot and wait a long time before I was able to be a full-time brewer."

Submitting a resume and talking to head brewers both proved unsuccessful, but Savage was tenacious. He quit his job raising money for a non-profit organization, a job that he didn't really like anyway, and was hired as a bartender and server at Dock Street. When he wasn't behind the bar, Savage was cleaning kettles and helping to brew — all for free — until by a matter of what he says was good timing and luck, he was offered a full-time brewing job in fall 1994.

In giving advice to homebrewers with a desire to brew professionally, Savage recalls his own experience. "I know what worked for me. Be willing to work for free for someone. In my case I was cleaning kegs and polishing copper. They didn't show me how to brew right away. They showed me how to clean kegs and polish copper. I kept at it. They also gave me reading material and I read on my own." By February 1996 he had been promoted to head brewer at Dock Street.

Looking back, Savage thinks he approached his quest in the best way for him. "Brewing is a craft. There is some thinking work and mathematical formulas, but the bottom line is it is a craft. The majority of your time you spend cleaning tanks, scrubbing things, or hauling grain. It's one of those things that you just get better at as you do it," he says.

While he has taken a leave of absence from homebrewing, he recently returned to the shop, Philadelphia's Home Sweet Homebrew, that gave him guidance in his early

days of homebrewing. Like many homebrewers, he often called his retailer in mid-brew with questions.

His first kit was given to him by a former girlfriend, a chef who was looking for a way to encourage him to spend more time in the kitchen. "Even before my first batch was finished, I was sold," he remembers. It was a typical American pale ale and although it was not altogether successful, he could identify with participating in a great craft, he says.

He recalls that while he couldn't quite identify the taste of that first batch, he continued to experiment, looking for that right combination. Trained as a musician — he played violin professionally for several years — he equates brewing with composing. It is similar to searching for a perfect note combination and not knowing exactly what you're looking for until you've found it. Brewing is "serendipitous" he says. "You sometimes happen upon a great beer without really trying. That's why it's important to take careful notes, so you can recreate what you just made."

Savage admits that he wouldn't homebrew from grain again but would like to continue to homebrew, perhaps with extract from the brewery. The ability to experiment with homebrews is something that Savage misses. "Homebrewing is wide open. You can do what you want. You can shuffle through your cupboards, find a box of Corn Flakes, and shake that into your mash if you want," he says.

But he says that because Dock Street brews so many different styles (65), the experimentation lies in trying to get the most authentic beer he can. Using true malts and aged hops allows him to emphasize the authentic flavor of each style.

A homebrewer interested in professional brewing can begin by working for consistency in his homebrew, Savage says. "Make consistently good products. Have a routine that works extremely well and stick with that routine. Make different styles, but systematize the way you work. If you are doing three hop additions in the boil, always do the hop additions at the same time so you can really start to understand what changes are happening with minute differences. Develop methods for formulating and executing every batch."

Developing methods is the best way to improve your beer, Savage says. "But don't change everything at once. If you are shooting for a style and determine that your beer is too bitter or doesn't have enough body, don't cut the hops in half and double the malts. Do small, incremental changes so you really understand what changes are affecting what."

Savage thinks the job market is a bit less competitive now with so many breweries. Savage still receives consistent inquiries from aspiring brewers and encourages people to pursue the craft. "Anyone who is really committed to becoming a brewer can do it. They just have to be willing to work for free or spend time in school," he says.

Extract to All-Grain and Back

by Sean Mick

It's time for some fancy footwork, brewing style. Perhaps you are making that step to all-grain and you want to bring your favorite extract recipes with you. Or maybe you don't have the time to do your normal five hour mash/sparge/boil, and extract is looking very appealing. If you take a methodical approach, virtually any recipe can be converted from extract to all-grain and vice versa.

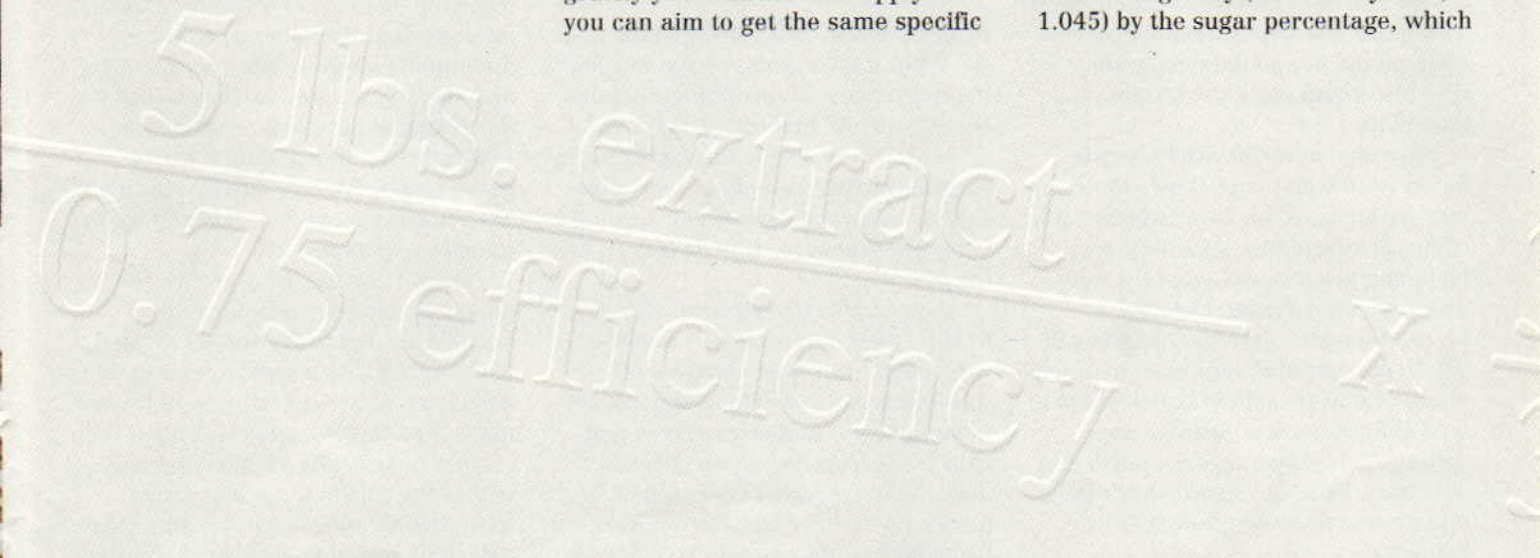
The most important element to translate is the malt. You'll need to know how many pounds of each type of malt (grains or extract) went into the recipe you want to convert.

Extract to Grain

To convert your extract recipe to grain, you need to know what specific gravity your extract will supply so you can aim to get the same specific gravity with your grains.

Malt extract is concentrated to a certain density to prevent bacterial spoilage and wild yeast fermentation during storage, and to reduce excess water weight and volume. It is measured in degrees Brix, equivalent to percent sugar per weight. Dry malt is virtually devoid of water (2 percent water, 98 percent solids) by definition and is therefore considered 100 percent sugar. This is the equivalent of 100° Brix. In one gallon of water, one pound of 100° Brix malt would yield a specific gravity of 1.045. Malt extract syrup is 80° to 83° Brix. One pound of an 80 percent mixture of sugar (80° Brix) dissolved in one gallon of water would yield 1.036 specific gravity.

Figuring this specific gravity relies on a simple equation. Just multiply the maximum gravity (that for dry malt, 1.045) by the sugar percentage, which



was 80 percent (0.8) in this case of 80° Brix extract. The trick is to translate the specific gravity into "points" before multiplying. Specific gravity can be expressed as points for convenience in calculating. Just subtract 1 and multiply the result by 1,000. Specific gravity 1.045 is the same as 45 points.

1.045 (S.G.) = 45 points
0.8 (80 percent) x 45 points = 36
36 points = 1.036 (S.G.)

After you finish your calculation, remember to convert your "points" back to specific gravity so that a hydrometer can confirm your calculations.

The example above assumed 80° Brix extract. If you know your extract is reduced to a different Brix number, you'll have to recalculate accordingly.

Now that you know what specific gravity your extract will supply, you can aim to get the same specific gravity with your grains, but you need to take into account that your brewing system will not be able to extract the entire 100 percent of sugar from the grains.

As a simple example, say you are making a Belgian Tripel that calls for nine pounds of domestic light extract. Light extract is generally created with only one pale "base" (enzymatic) malt, usually a two-row variety. To recreate the same effect in your beer, you should use the same pale malted grain. This grain has a maximum extraction of 36 points per pound per gallon. (See Maximum per Pound, right, for guidelines.)

If you've never brewed all-grain before, you won't know how efficient you are going to be, as brewhouse efficiency is affected by several factors including grain crush, wort viscosity, and lauter tun design. Unless you know otherwise, assume that you will get 75 percent of the maximum quoted above (1.036 specific gravity), which is typical for a homebrew lautering system. This percentage is known as efficiency. Now, to convert your nine pounds of extract to grain, do the following:

1. Determine how many points per pound you will get from the extract. In this case it is 36 (1.036).

2. Determine how many points per pound (estimated) you will get from one pound of grain. This is 75 percent (your efficiency) of 36 (the maximum yield for pale malt), which is 27.

3. Multiply the weight of extract (nine pounds) by the ratio of points from extract (36) over points from grain (27).

$$9 \times \frac{36}{27} = 12 \text{ lbs. of grain.}$$

So 12 pounds of two-row malt provide the same yield as nine pounds of light domestic extract.

Maximum per Pound

Malt	% and Points
Pale malt	78% / 35
Munich malt	78% / 35
Crystal malt	72% / 32
Chocolate malt	70% / 32
Black malt	65% / 29
Dry malt extract	98% / 44
Malt syrup	80% / 36
Rice	98% / 44
Wheat	85% / 38

Amber, Dark, Wheat Extracts

What if the extract recipe in your hand is made with proprietary blends of malt called "Amber," "Dark," or "Wheat"? How do you convert these to all-grain? With the help of some specialty grains, you can closely approximate any 100 percent malt extract on the market.

Almost all extracts start with a healthy dose of base malt, usually a two-row pilsner-type malt from the same country or region as the extract manufacturer. Amber extract is typically 90 percent to 95 percent pale malt, up to 5 percent crystal malt, and/or up to 3 percent chocolate or black malt. Dark extract is typically 90 percent pale, 5 percent roast, 5 percent crystal or chocolate. Every extract producer varies from this, depending on personal tastes, the need to fill a market niche, or the desire to blend an extract for a particular style of beer (as is the case with extract kits). Refer to the chart on page 48 for general guidelines on replacing these types of extracts with their grain components.

In general gather as much information on the product as you can, but also trust your senses. Although most producers will not tell you what their exact percentages are, these numbers can sometimes be inferred from the published information. For instance pale malt has a pH of 5.24. If a nut brown extract has a pH of 4.86, you can infer that roasted grain (which has a low pH) was part of the formulation, as opposed to only using crystal malt to give color. Check with your local homebrew shop owner for details on particular extracts. A knowledgeable shop owner may be particularly helpful in determining the components of canned extract kits.

To and From Extract With Grains

For extract recipes that steep specialty grain, the general rule is to use the same amount of grain called for in the extract recipe when converting to all-grain. This assumes the steeping was done correctly; that is, for 30 minutes or more the grain was rested in water ranging from 149° to 168° F, allowing all of the color and flavor to leech out as in grain brewing. It also assumes that the same type and amount of water are used for mashing and steeping. Highly carbonate waters, for example, have been reported to impede extraction and lend astringency and/or haze to the final product. You should be aware of this and try to match water types.

Converting specialty grains pound for pound works for most crystal/caramel malts and all roasted malts/barley, but a special note should be given to toasted grains, light crystal malts, and flaked adjuncts. Unless the extract recipe calls for a partial mash with some enzymatic grains, any toasted malt added as a steeping grain only adds starch to your beer! Toasted malts need the help of enzymes from other base malts to convert their starch to simple sugar. Otherwise, they only contribute haze, complex sugar (starch), toasty flavor, and color. The

starch can't be broken down by brewing yeast, but it may look inviting to bacteria as a food source once the yeast go dormant.

With toasted malt and very light caramel malt (including dextrin malt), you should *always* employ an enzymatic rest. If you are converting from extract to all-grain, there is no problem, but if you are scaling down an all-grain recipe that includes one of these toasted malts, you'll have to either delete it or employ a partial mash. There are some extracts on the market that have toasty/bready flavors to them, so hunt around if you don't like the idea of partial mashing. Another simple solution for dextrin malt is to substitute malto-dextrin powder (0.72 lbs. malto-dextrin for each pound of dextrin malt).

With all of these tidbits and mathematics in mind, here's a more challenging example. Say you are faced with converting the following extract recipe:

- 5 lbs. domestic amber extract
- 3 lbs. Dutch light dry malt extract
- 2 lbs. domestic "Munich" extract
- 1/2 lb. roasted barley

It looks like a mess to convert until you break it down to its constituent parts. Take the five pounds of amber extract. We need to convert the extract to a grain equivalent.

5 lbs. extract syrup yields 1.036 gravity per pound per gallon, so

$$5 \text{ lbs. extract} \times \frac{1.00}{0.75} \text{ (efficiency)} \times \frac{36 \text{ points/lb./gal. from extract}}{36 \text{ points/lb./gal. from grain}}$$

$$= 6.67 \text{ lbs. of grain}$$

If you look at the table on page 48 for amber extract, it tells you that every pound of amber extract uses approximately 0.08 to 0.1 pound of crystal malt in addition to the base malt. Taking the average of this range gives 0.09 pound or 9 percent crystal. To calculate this amount in pounds, simply multiply the total grist, 6.67 pounds, by 0.09 (the decimal equivalent of 9 percent) to reach 0.6 pounds of crystal malt. This leaves a remainder of 6.07 pounds, which is the amount of pale two-row grain.

Use the same process with the next extract:

3 lbs. Dutch dry malt yields 1.045 gravity per pound per gallon, so

$$3 \text{ lbs. dry malt} \times \frac{1.00}{0.75} \text{ (efficiency)} \times \frac{45 \text{ points/lb./gal. from dry malt}}{36 \text{ points/lb./gal. from grain}}$$

$$= 5 \text{ lbs. grain (100 percent two-row pale malt)}$$

Domestic Munich extract yields 1.036 gravity per pound per gallon.

Therefore:

Various Generic Extracts and Their Grain Components		
Extract Type =	**Base malt** +	**Specialty Grain Added per pound**
Light/Pale	100% American pale malt 100% British pale ale malt 100% German pils malt	n/a
Amber	0.9 to 0.975 lb. "base malt"	0.08 to 0.1 pound crystal 40-60° L or 0.025 lb. chocolate malt
Dark	0.8 to 0.9 lb. "base malt"	0.10 lb. roasted barley or black malt plus 0.05 lb. chocolate malt (optional) plus 0.05 lb. crystal malt (optional)
Munich	0 to 0.7 lb. domestic or Pilsner malt	0.3 to 1 lb. Munich malt
Wheat	0 to 0.7 lb. domestic or Pilsner malt	0.3 to 1 lb. wheat malt

$$2 \text{ lbs. extract} \times \frac{1.00}{0.75} \text{ (efficiency)} \times \frac{36 \text{ points/lb./gal. from extract}}{36 \text{ points/lb./gal. from grain}} = 2.67 \text{ lbs. of grain}$$

Since this is Munich extract, which the chart indicates is about 50 percent Munich malt and 50 percent two-row pale malt, the actual numbers will be 1.33 lbs. light Munich malt and 1.33 pounds pale two-row.

And finally, one-half pound of roasted barley remains the same. Combining all of the grains gives:

- 12.4 lbs. pale two-row malt
- 0.6 lbs. crystal malt
- 1.33 lbs. light Munich malt
- 0.5 lbs. roasted barley

When you actually get to the mashing stage, you'll have to determine at what temperatures to rest for saccharification. Extract manufacturers commonly rest at 150° to 152° F to create a base extract that is not overly dextrinous and works for a wide range of applications. (Dextrins are unfermentable and thus contribute to body and final gravity.) When substituting grains for extract, use an infusion mash temperature in the range of 150° to 158° F. Lower temperatures produce worts with fewer unfermentables than worts made at temperatures of 156° to 158° F, the recommended range to reproduce a dextrinous extract.

All-Grain to Extract

In terms of calculations, the reverse of the above information is true to convert any all-grain recipe to extract. Pay special attention to toasted malts as noted. Light malt extract is best for conversion since the specialty grains, except toasted, can remain the same. If Munich malt is part of the grain bill, there are sources for 50 percent to 100 percent Munich extract. You may need to blend accordingly.

Keep in mind that you should match country or region when converting. That is, use domestic extract for domestic pale malt, British extract for British pale ale malt, German extract for German pils malt, and so on. If you plan to use domestic light extract to convert British pale ale malt, add a little extra crystal (1 percent to 2 percent) to bump up the color and compensate for the lack of caramel flavor in US pale malt extract.

Here's a conversion of a real (and tasty!) all-grain recipe to its extract equivalent. This is an amber ale in the tradition of West Coast microbreweries. Use the hop information in "Converting Hops," page 50, for hop conversions.

Ingredients:

- 9 lbs. two-row malt
- 2 lbs. crystal malt, 80° Lovibond
- 0.5 lb. wheat malt
- 2 oz. Mt. Hood hops (5.6% alpha acid), for 60 min.
- 1 oz. Cascade hops, for 10 min.
- 1 oz. Willamette hops, for 5 min.
- Wyeast 1056 (American Ale)

Converting Hops

If you are changing the water volume, hence the density of the wort boil, you'll have to adjust the hopping rate, too. For instance if you cut the boil volume in half as many extract recipes do, you'll need to double the boiling hops. In general you can recalculate the amount of boiling hops needed by multiplying the original amount of hops by the ratio of the two boil volumes, according to *Using Hops* by Mark Garetz (published by HopTech).

For example say you are planning to boil 3 gallons of wort, and the original all-grain, full-boil recipe called for 1.75 oz. of 6 percent alpha acid hops. Suppose also that this year's hop harvest yielded those same bittering hops at only 5.2 percent alpha acid. You would use the following formula:

$$\frac{\text{all-grain boil volume}}{\text{extract boil volume}} \times \text{weight of hops in oz.} \times \frac{\text{original alpha acid \%}}{\text{current alpha acid \%}}$$

In our situation this yields:

$$\frac{5 \text{ gallons}}{3 \text{ gallons}} \times 1.75 \text{ oz.} \times \frac{6.5\% \text{ alpha acid}}{5.2\% \text{ alpha acid}}$$

= 3.65 oz. hops at 5.2% alpha acid for a 3-gallon boil.

This rule does not apply to the finishing hops, though. You are only after aroma from the finishing hops, and these compounds are extracted regardless of the wort density. It is the isomerized hop oils that need special attention. A change in density will affect how much the raw hop acids are converted into bittering agents, iso-alpha acids. You may need to do some tweaking with flavoring hops, those that usually are added in the middle of the boil, but start out by keeping them the same.

If you have a large flavoring addition, you may want to keep it the same and increase the bittering addition beyond the general rules. The flavoring hops add some bitterness, so this contribution will be reduced in an extract recipe of greater density, but consider the flavor impact of additional hops added in the middle.

Step by Step:

Mash in at 152° F for 60 min. Sparge and collect 6.5 gal. runoff. Boil for 60 min., adding hops as noted.

Conversion

Remember, it's best to use pale extract from the same region of the world as a substitute for enzymatic grain whenever possible. Since this is domestic grain, use domestic extract. The calculation for converting the two-row to pale extract looks like this:

$$9 \text{ lbs. grain} \times 0.75 \text{ efficiency} \times \frac{36 \text{ points/lb./gal. extract}}{36 \text{ points/lb./gal. from grain}}$$

$$= 6.75 \text{ lbs. extract (domestic)}$$

Crystal malt can be steeped, so the amount remains the same in the converted recipe. Wheat malt can't be steeped. It's a base malt (starch-containing enzymatic malt), so you have two choices: Either perform a partial mash with the wheat and crystal, or convert the wheat malt to wheat extract. If the latter sounds appealing, here's the conversion:

$$0.5 \text{ lbs. wheat malt} \times 0.75 \text{ efficiency} \times \frac{36 \text{ points/lb./gal. extract}}{36 \text{ points/lb./gal. from grain}}$$

$$= 0.375 \text{ lbs. wheat extract}$$

Before you think you're done, chew on this: Wheat malt extract is almost never 100 percent wheat. (Think about the sparging nightmare of 100 percent wheat without the help of husk material and the hindrance of all those beta-glucans!) So divide the result above, 0.375 pounds, by the percentage of wheat expressed as a decimal, 0.5, to get the correct amount of wheat in extract. This results in 0.75 pounds of extract to get 0.375 pounds of wheat. The remaining extract, 0.375 pounds, is from pale malt and needs to be subtracted from the pale extract totals to avoid overshooting the gravity.

For the hops, you need to consider the boiling hop and the amount of water you intend to boil. If you are limited to a 2.5 gallon boil, convert the hopping amount by the ratio of the boil volumes. Conveniently, this equates to doubling the boiling hops. (Use this as an estimate for a test batch and adjust to taste for future brews.) Putting your converted recipe all together, it looks like this:

- 6.375 lbs. pale extract (domestic)
- 0.75 lbs. wheat extract (domestic, 50% wheat)
- 2 lbs. crystal malt, 80° Lovibond (steeped 30 min. at 150° to 170° F)
- 4 oz. Mt. Hood hops, for 60 min.
- 1 oz. Cascade hops, for 10 min.
- 1 oz. Willamette hops, for 5 min.

Armed with some knowledge of the raw materials, a little math, and your senses, you can convert virtually any recipe to suit your homebrewing practices. ■

It's All Right to be Left

by Stan Hieronymus and Daria Labinsky

When Left Hand Brewing Co. co-founders Eric Wallace and Dick Doore wrote their business plan, they probably didn't pencil in two Great American Beer Festival medals during their first year of operation. And they certainly didn't plan on a visit from a government regulatory agency that might have put them out of business.

"You go from being an overgrown homebrewer to running a business real quick," Wallace said this past fall, as the Longmont, Colo., brewery neared its fourth anniversary. When they started brewing in January 1994, Wallace and Doore owned 25 kegs and sold 22-ounce bombers door to door. Today, they own 2,000 kegs, and in October Left Hand announced a merger with Tabernash Brewing Co. of Denver.

The brewery's logo, a silhouette of a hand, stands out whether it's on the grain silo or a tap handle.

Tabernash moved its operations into Left Hand's brewery and is building a $1 million, 6,000-square-foot addition. The two brewers will share equipment, including a bottling line for 12-ounce bottles, which should be in operation by the summer.

Left Hand's work force has increased from two to 17 — 14 of whom are full time — in four years. Doore now oversees production, while Wallace handles marketing and sales. On a typical day the brewery resembles a beehive, with workers swarming around the various rooms. Sales personnel gather in the front office. Cellarman Bubba Love (whose real name is seldom mentioned) is at work in the fermentation and conditioning room, where Black Jack Porter exhibits signs of vigorous fermentation — the blowoff bucket overflows onto the floor. Workers bottle 22-ounce bombers by hand on the small bottling machine. Brewers Matt Gilliland and Steve Seiwerath assist the expansion crew.

Doore and Wallace did not envision rapid growth. Their goal was to operate a brewery that shipped 2,500 to 3,000 barrels and employed three or four people. "We were so naive, it was absurd," Wallace says.

What they got was a baptism by fire, because early successes forced them to run the brewery at capacity right away. The first batch of beer was brewed in January 1994, and that April Left Hand Sawtooth Ale took best in its category and Best of Show at the Great International Beer Tasting in Denver. Then, at the 1994 Great American Beer Festival, Sawtooth took a gold medal, Black Jack Porter won a bronze medal (and it was the first batch of porter the brewery made), and Juju Ginger Ale received honorable mention. The 17-barrel system, capable of producing 1,700 barrels a year, was nearly maxed out; Left Hand shipped 1,400 barrels

that first year. Since then, the brewery has expanded in increments.

Left Hand makes five year-round beers and a variety of seasonals. Sawtooth Ale, an English-style extra-special bitter, is based on one of Doore's favorite homebrew recipes. The well-balanced bitter is made with five malts and a combination of English hops. "That's fairly normal for us," Wallace says. "We are looking for depth and complexity." While Longmont's glacier-melt soft water is ideal for brewing, the brewers harden it to simulate the water at Burton-on-Trent, the home of English bitters. Sawtooth accounts for almost half of the brewery's sales.

Black Jack Porter is a London-style porter with a very dark ruby color. It's made with two-row pale, crystal, and chocolate malts, and Northern Brewer and Kent Goldings hops. The chocolate malt lends a pronounced roastiness, which is balanced out by the Kent Goldings, and the water is conditioned to a medium hardness. It has 6.2 percent alcohol by volume (ABV).

Motherlode Golden Ale is a malty Scottish-style ale made with two-row, Munich, and crystal malts and lightly hopped with Northern Brewer and Cascade for bittering only. It is brewed from a fairly high gravity, and the relatively low attenuation leaves a residual sweetness. A high mash temperature produces a full-bodied beer.

Left Hand's Juju Ginger Ale is a low-gravity pale ale with some of the hops replaced by freshly ground ginger root. The result is a light-bodied, refreshing beer with a distinct ginger aroma and a very crisp finish. It weighs in at 4.2 percent ABV.

Jackman's American Pale Ale is an American-style pale ale flavored with Nugget and Cascade hops and finished with Mt. Hood. As with all the beers, the brewers' goal with Jackman's was to find a balance, especially with the hops. Pale Ale has an ABV of 5.6 percent.

One popular seasonal is Maid Marion Berry, which is a cross between an ale and a mead. Marion berries are added during the fermentation, and the drink has more of a mead character because of the substantial amount of honey used. Other seasonals include XXXmas Ale, a spiced strong ale; Deep Cover Brown Ale; Bard's Ale, a traditional mild brewed for the Colorado Shakespeare Festival; St. Vrain Organic Tripel; and Imperial Stout, made with some flaked oats for added body and smoothness.

The seasonals are not only fun to brew but are good business. "You create excitement and novelty in the market," Wallace says. "I'll get asked all year long when the Imperial Stout will be on." Left Hand will make five 34-barrel batches of the stout; much more would not be practical because of the longer production time. The imperial stout takes twice as much malt as other beers and must be transferred more often because it isn't filtered. "It's about 1.090 (specific gravity), plus or minus," Doore says. "Basically, we fill up the mash tun and we get whatever we get. We keep pouring in two-row until we stop."

Given such a sentiment, it's no

surprise that Doore and Wallace started as homebrewers. Wallace developed an appreciation of fine beer early on; his father was an officer in the US Air Force, and the family lived in various countries, including Germany. They moved to Colorado in the late 1970s, and Wallace was appalled to discover mainstream American beer. He tasted a domestic lager and thought someone was playing a joke on him. "I could never accept the fact that the richest country on Earth couldn't produce a good beer," he says.

He and Doore met as cadets at the US Air Force Academy in Colorado Springs in the early 1980s. Wallace spent eight years in Italy and Turkey as a communications officer with the Air Force, and met his Italian wife, Cinzia, in London. They moved to Colorado in 1993, by which time the craft-brewing movement was in full swing. Doore left the Air Force in 1990 and earned a master's degree in mechanical engineering from the University of New Hampshire before heading to Colorado.

Two medal winners, including Black Jack Porter, helped Wallace (left) and Doore far exceed first-year sales projections.

The partners-to-be were living in Niwot — named for Chief Niwot, whose name translates to "Left Hand" — and thinking they needed to find jobs, when they decided to start a microbrewery. They found a suitable building, a former sausage factory (the mash tun sits over the old pig killing floor) that had sloped floors with drains in them. Its location on two acres of land along the St. Vrain River provided room for expansion.

The brewery remains a mixture of high and low tech. Kegs are still filled by hand, but there is a separate lab, where the beer is monitored and samples of just about anything else in the brewery can be analyzed.

Warning signs are posted throughout the building, alerting employees to potential dangers. They're much more

BREWER'S MARKETPLACE

prominent than one usually finds in a microbrewery. An Occupational Safety and Health Administration representative literally came knocking at the door in early 1995 after OSHA received a complaint from a disgruntled former employee. Doore and Wallace discovered they were in violation of many OSHA regulations, due to ignorance, and wondered if they would survive the potential fines. As part of an agreement with OSHA, they promised to educate other equally oblivious brewers about the regulations.

While Left Hand beers are currently distributed throughout Colorado and in eight other states, 80 percent of sales are within the state, and the bulk of those are in Longmont and nearby Boulder. Left Hand has 80 tap handles in Boulder County, and those handles move 400 kegs a month. The distinctive handle, which features a black left hand bearing the appropriate bottle label, may have contributed to Left Hand's on-draft success.

Wallace wants to make sure Left Hand remains distinctive in the marketplace. That's one reason Bubba Love recently began learning how to condition "real ale" in British firkins, something almost unheard of in Colorado. "This is a fairly sophisticated beer market — that's a good thing," Wallace says. "But there are a lot of people who have seen that and tried to move in."

He's confident that the alliance with Tabernash will increase Left Hand's ability to serve its current market and allow for greater expansion, since it makes both breweries more efficient. "They make great beer, and we're both respected in our home market," Wallace says. "I think it's a good combination."

Left Hand hosts brewery tours on Saturdays. The small tasting room and retail sales desk are open 8 a.m. to 6 p.m. weekdays, 10 to 5 Saturdays.

Left Hand Brewing Co. is located at 1265 Boston Ave., Longmont, Colo. Call (303) 772-0258. Its Web page is: www.lefthandbrewing.com. ■

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

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Mini-Mash/Lauter Tun

A combination mash tun and lauter tun patterned after professionally designed brewing equipment is now available for the home and small-batch brewer.

The polyethylene unit by Hobby Beverage Manufacturing Co. is 12 inches by 17 inches in size with a grain capacity of five to 25 pounds. The 3:1 width-to-height ratio, similar to that of a professional lauter tun, allows for a choice of grain depths. Water from the hot liquor tank or kettle drives the sparge arm. The false bottom is a removable screen that stands 2.5 inches above the true bottom.

For more information contact your local retailer. For wholesale information or to find the dealer nearest you, call Hobby Beverage Manufacturing Co. at (909) 676-2337.

CD-ROM

Cave Art Studios has a bimonthly CD-ROM magazine called Blue Bat Bottling Co. The interactive publication includes brewpub and special-events reviews, brew competition listings, recipes, videos, and puzzles.

The newest feature in the magazine is The Cyber Connection, which

contains homebrew software reviews and a list of Worldwide Web links to beer sites.

A one-year subscription provides six issues. It is available for $34.95.

For more information call (704) 252-9571 or e-mail bluebat@caveart-studios.com.

New Kits

Spagnol's Wine & Beer Making Supplies Ltd. has added two new beer styles to its Brew House line of all-grain wort kits. The Brew House Stout has a rich, roasted malt character with a dry, smooth finish. The Brew House Wheat Beer uses malted barley and German hops to produce a crisp, spicy character.

Brew House kits contain wort that is packaged to retain a malty character, grain flavor, and hop aroma.

For more information on the stout, wheat, or other styles, call 1-800-663-0954 or visit the Web site at www.thebrewhouse.com.

Warning Labels

The Novelty Beer Hazard Warning Label from Aardvark Brewing Supplies is a humorous addition to kegs, refrigerators, fermenters, tool boxes, and bar areas as a lighthearted warning to beer drinkers.

The sign has the authenticity of an official hazardous-material label with funny beer-related expressions, such as "Health Hazard: Level 1 — A Little Tipsy, Level 2 — Giddy, Level 3 — Obnoxious, Level 4 — Unconscious."

For more information or to order, call 1-888-719-4645.

Sparge Arm

Advanced Brewing Technology is marketing an all-stainless steel sparge arm for dependable, hassle-free sparging.

The arm encourages full sugar extraction by allowing the sparge water to uniformly spray over the grain bed in a circular pattern. The arm is adjustable to accommodate batch size and fits on the keg above the grain.

For more information contact your local homebrew retailer. To find the dealer nearest you, call Advanced Brewing Technology at (847) 548-0048. ■

The Homebrew Widows Club

by Carole Leone

December 24, 1995, is a day I will never forget. It is the day I lost my husband. Oh, don't get the wrong idea; he's still around. He's just found a new life — the life of a homebrewer. The day I speak of is the day his ol' buddy stopped by and brought him a Christmas gift of a homebrew — some fancy concoction in a pretty Grolsch bottle.

Soon after that day, I found my husband in the kitchen with his own three-gallon pot and a fat little package of yeast, and I knew it had happened. I had become a Homebrew Widow.

Throughout the next year I found all conversations with my husband overtaken by talk of specific gravity, bottling, and Hallertauer vs. Cascade hops. I went to places I never thought I'd find myself — microbreweries and brewing supply stores. I learned to rinse and save all bottles that don't have screw-on caps. I used to find my way into his heart with romantic dinners and secret rendezvous. That was BH (Before Homebrew). Now the way to my husband's heart is with a bottle washer or a kegging device.

Feel sorry for me yet? It's okay. I have plenty of company. Homebrew Widows usually come about in groups, due to the fact that husbands never brew alone. They have allies who bring over their own homebrew, which they all drink while brewing (makes me wonder how the beer ever really gets made). So all of us wives and significant others get to hang out and find our own fun. What amazes me, though, is that our husbands think we're sitting around talking about beer. Well, maybe we are, in a way. We're talking about ways to get rid of the malt smell in the house, the effects of having fermenting buckets in our bedrooms (I do, doesn't everyone?), and the best excuses not to try the latest brew ("I don't like dark beer," "I've drunk too much already," and "I'd better not, I might be pregnant").

Homebrew Widows find some solace in laughing about the myths our former loved ones have told us. Some of the more popular ones:

"Bottling should only take an hour, tops."

"I had a boilover, but I'll clean it up as soon as I'm finished."

"I like to make the beer more than I like to drink it."

"That's the wheat floating around in there — it's okay, go ahead and drink it."

We're all Widows: Gina Ashby (left), Stephanie Spotanski, and me.

"Making my own beer will save us a lot of money."

Our sisterhood grows stronger as we acquire new Widows. We take them under our wings and shake our heads at their naivete. One new Widow told us that her husband promised he would only brew a few times a year and he'd do it the easy way, with extracts. We gave each other knowing looks. Six months later, Dan possessed a second carboy, had plans for his first all-grain experience, and was looking into making wine on the side.

We found out one time that a new Widow was going to break our most stringent rule. With wide, bright eyes, she exclaimed, "He said it was fun brewing, so I thought I would help him this weekend." We gasped in horror. Hadn't she read about Tom Sawyer and the fence? After many hours, we had persuaded her not to join the ranks of those who had passed to the other side. Stay with us, where you belong, we told her. We will take care of you.

So now you know our sad story. Although it isn't sad *all* the time. Being a Homebrew Widow has its good points...let's see, what were they? Oh yeah...

1. We always have beer.
2. We always know that a carboy or hydrometer will make the perfect birthday gift.
3. We have lots of time to shop (but no money — it all goes to the money-saving beermaking supplies).
4. We can impress non-Homebrew Widows with fancy jargon when tasting beer (as in "I think this beer is over-hopped").
5. We own bottle washers, which really are pretty handy.

There's still hope; my anniversary is coming up and he says he has something very special for me. It could be a diamond or a car or...wait a minute. He said it was a beautiful amber color and would be ready in a few weeks. Oh, well. It's the thought that counts, right? And I really *do* like homebrew (don't tell the other Widows!). ■

Do you have a 750-word story for Last Call? Mail it with a color photo to Last Call, c/o Brew Your Own, 216 F St., #160, Davis, CA 95616.

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