Brew Your Own™

March 1996, Vol.2, No.3
Niche Publications Inc.

THE HOW-TO HOMEBREW BEER MAGAZINE

HOMEBREW SPY FLIES TO IRELAND

Guinness Brewers Confess the Secrets of Stout!

Grow Your Own Hops

The 10 Most Common Brewing Questions, Answers Included!

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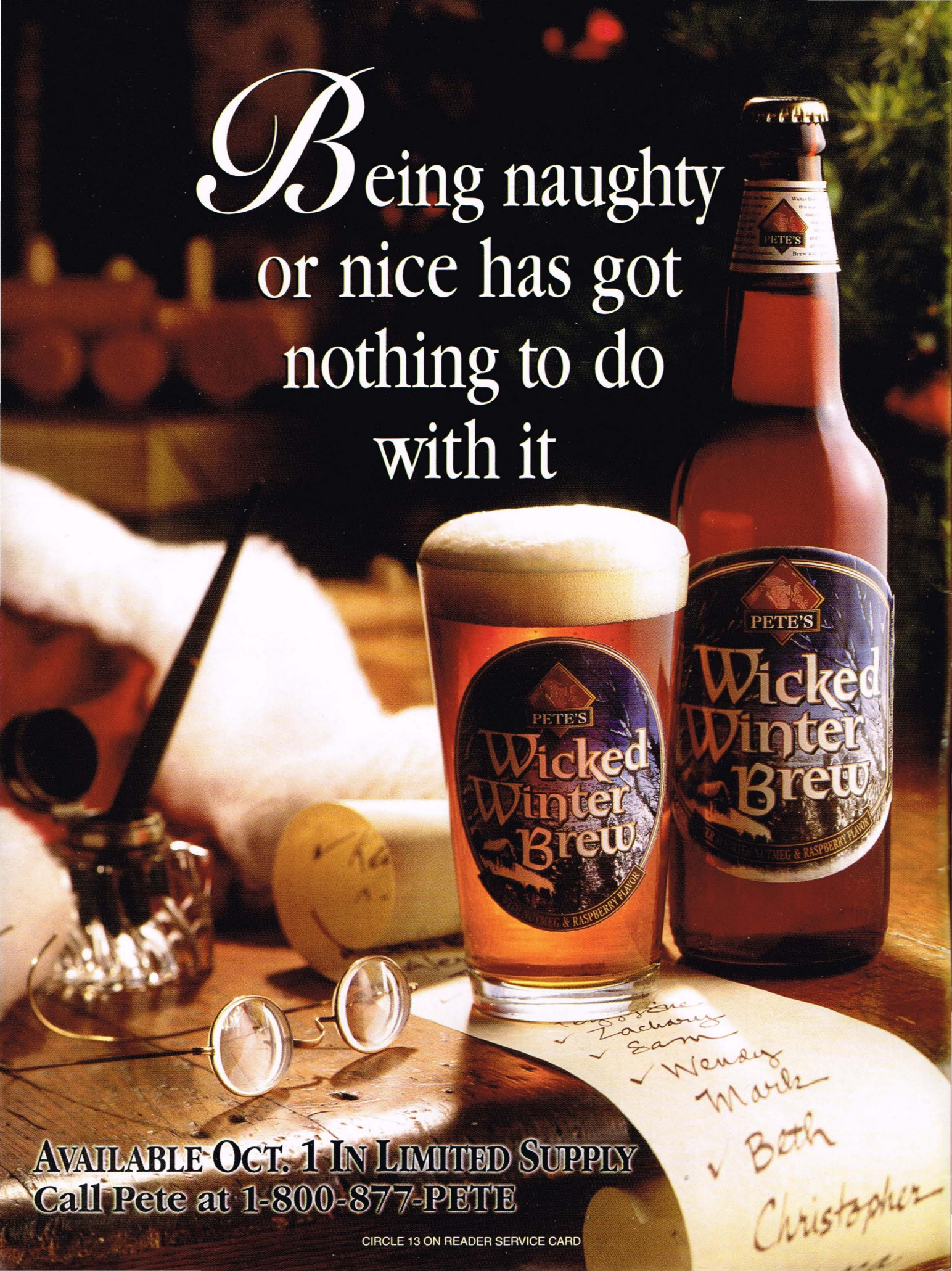
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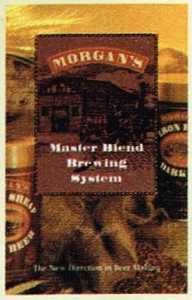
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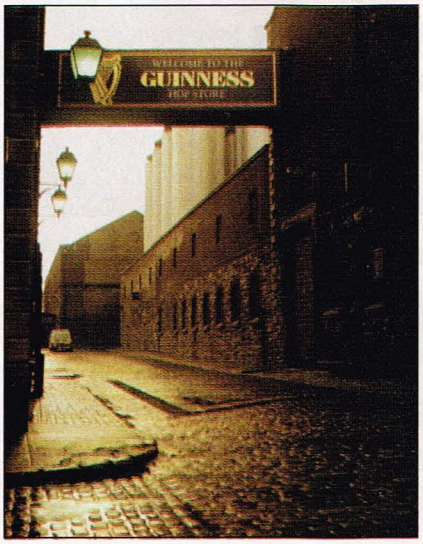
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Off to Dublin

Let me begin by saying I have never been to Ireland.

I picture it as a land of rolling green hills, quaint seaside towns, gregarious and friendly people, and amazing beer. A place, in short, everyone should visit. Especially, to my way of thinking, me.

I have friends who have done the whole thing. They have flown to Dublin, rented a car and driven from County Cork to County Clare to County Kilkenny, sipped pints in quaint pubs in ancient fishing villages, kissed the Blarney Stone, the works. But I never made it. Too many deadlines, too little money, too many vacations spent flying across the country to see family, always too something.

So when we decided to send a homebrewer to the Emerald Isle for an up-close-and-personal, behind-the-scenes look at the Guinness Brewery, the Sanctuary of Stout, I knew the perfect person for the job.

Who better than someone who's never been there, someone who's eager to go? Someone who's an avid, knowledgeable homebrewer. Someone who loves stout. Someone who's a brilliant writer, to boot!

We all agreed those were the perfect qualifications, which is why we sent...Sal Emma.

Actually, I came closer to going than I like to think about. Sal, who lives near Cape May, N.J., arranged for four days off from work. His flight was set up on Aer Lingus for January 9 from Kennedy airport in New York. He planned to touch down in Dublin, do some investigative research on the social habits of the locals, then hit the brewery the next day.

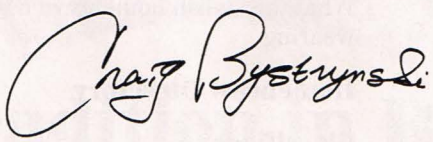
He would have been right on schedule, too, if it hadn't been for a little frozen water. The three feet of it, that is, that fell on New York City and the rest of the Eastern Seaboard on the day of his planned departure. The airport was closed down for two and a half days. Sal bided his time in New York, unable to take off and unable to get home. Meanwhile, his vacation days were dwindling, deadline was approaching, and several appointments set up in advance had long since passed.

Eventually, of course, he was able to fly, three days and a few frazzled nerves (ours, not his) later. Even with an abbreviated schedule, he was given relatively free reign in the brewery, enough to unearth a recipe, mash schedule, and fascinating information on processes and equipment, and to make a few friends. He even went pub crawling with some of the Guinness brewers!

Check out the result of his labor, our cover story beginning on page 42. And if you like it, let us know. We're thinking of making the "tour" of a classic brewery an annual feature. (Hey, I've never been to Belgium!)

And if you were one of the bazillions of people who called in response to my plea in the February editor's note, thank you! In the midst of a gripping story about my wedding cake, I mentioned that our publisher felt no one ever read the editor's note. I asked people to call in and tell him he was dead wrong! And as a little incentive offered t-shirts to the first 10 callers. The first call came before the magazine even went to press. It wasn't hard to figure out that it was one of our contractors using a cleverly disguised name (you know who you are, Mark Larson!). No t-shirt for him.

In the end we received more than 200 calls, and they were still coming in as we went to press. Carl, the publisher, now knows he was dead wrong, but Ethan, who answers the phones, is extremely overworked. Be nice to him if you call the office.



Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

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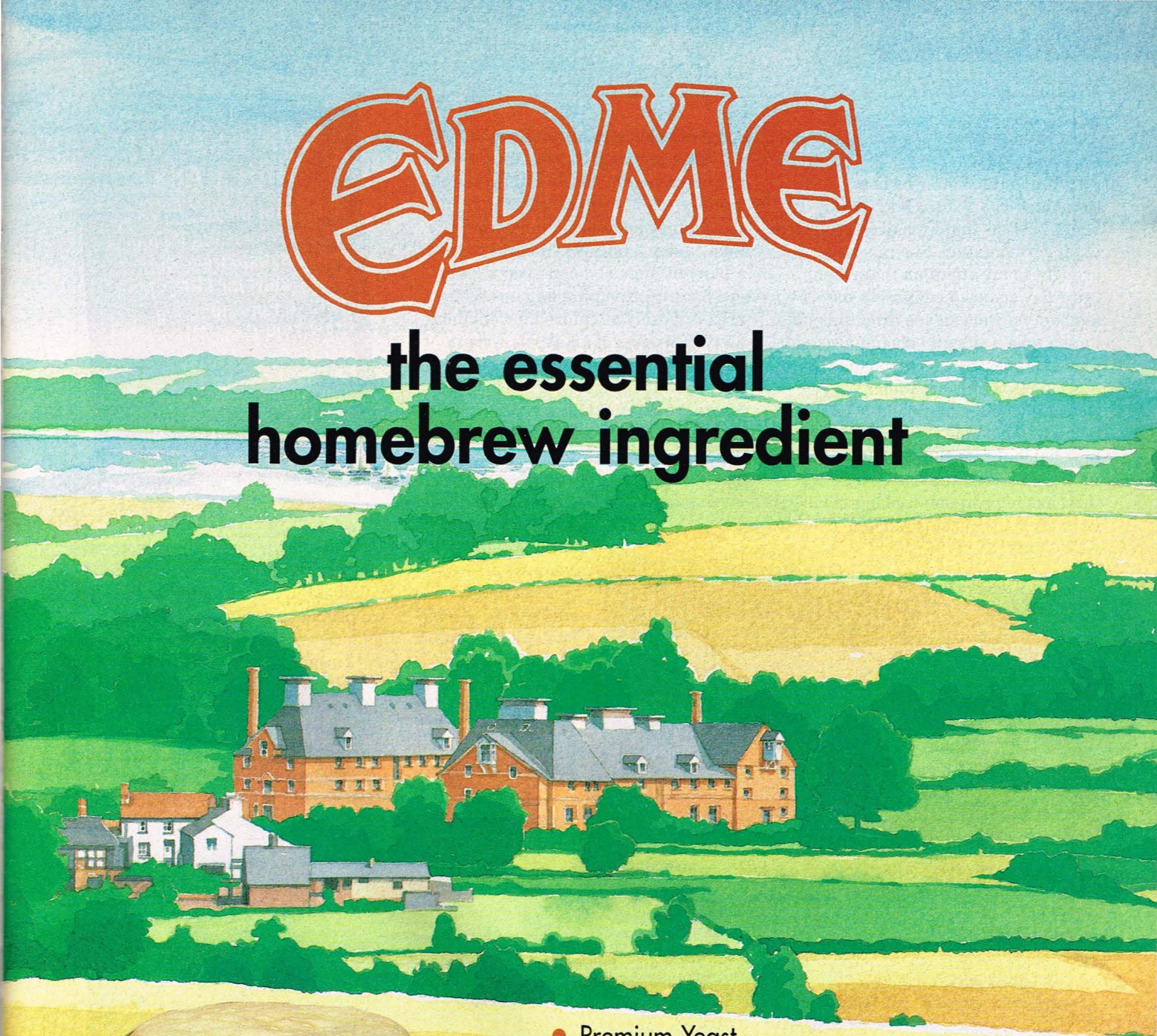
Brew Your Own (ISSN 1081-826X) is published monthly for $44.95 per year by Niche Publications, 216 F St., Suite 160, Davis, CA 95616; tel. (916) 758-4596; fax (916) 758-7477. E-mail address: BYO@byo.com. Application to mail at second class rates is pending at Davis, CA and additional mailing offices. POSTMASTER: Send address changes to ***Brew Your Own***, P.O. Box 1504, Martinez, CA 94553-9932. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write ***Brew Your Own***, P.O. Box 1504, Martinez, CA 94553-9932. Tel (510) 372-6002. Fax (510) 372-8582. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $60.95; for all other countries the subscription rate is $80.95.

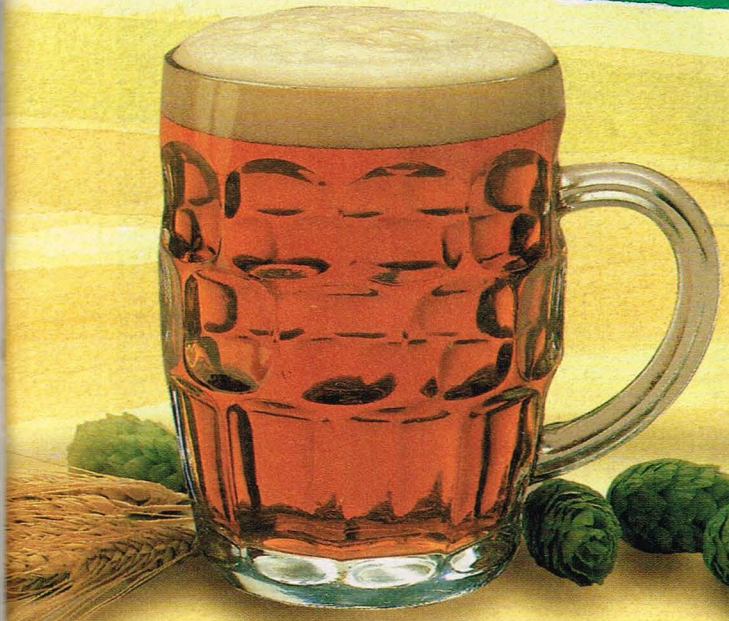
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CIRCLE 21 ON READER SERVICE CARD

Tom Holcomb
Corunna, Mich.

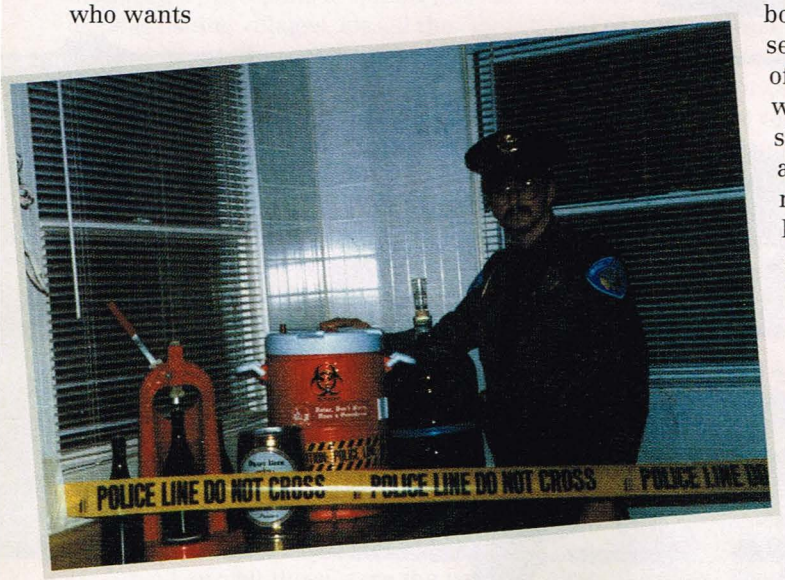
My spouse, Joie, who is a Homebrewer's Wife, a.k.a. "Good Sport," claims that I am over-protective of my fermentation. She recently brought to my attention that when brew day comes, I confiscate the kitchen. As you can see from the photo, I am a police officer. I should also add that I emphasize the responsible use of our homebrewing creations.

As my better half politely pointed out, when it's time for me to brew a new batch, I raid the kitchen and seal off the entrance and exit points. She then has to postpone cooking meals until after the yeast is pitched. (Hey, who wants spaghetti sauce in his primary?)

After pitching, the situation does not improve. I mobilize and invade the laundry room. I set my carboys up on the counter and check them several times a day. I ferment in carboys with a blow-off tube so I can keep a close eye on my fermenting batches. This area is closely monitored for anything awry. (I wonder if an alarm system could be placed on a carboy?)

When bottling day arrives, I relocate from the laundry room back to the kitchen. Once again, the kitchen is cleared of hostile forces — kids, pets, visitors, spouses. My bottles are cleaned and filled with my favorite ale. When the last bottle is capped, I see an expression of relief on my wife's face. Often, she will sigh and ask, "Does your next batch have to be one of those all-grain brews? They take all day!"

The bottled beer is carefully placed in the "aging closet" (formerly known as the hall linen closet). The closet is sealed to deter tampering.



Tom Holcomb takes no chances with his brew — he keeps his carboy under tight surveillance.

When my alleged "over-protectiveness" was brought to my attention, I explained to my wife that these steps are proper procedure for making homebrew. She just looked at me with an "I'm-not-buying-it-Buster!" look.

Still proclaiming my innocence, I demanded to be judged by my peers. (My peers, of course, are fellow homebrewers.) Therefore, I am submitting my case to the readers of *Brew Your Own*, so that they may judge me accordingly.

DON'T SAY WE DIDN'T ASK!

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Military Madness

Oregon has been called the "Microbrew Capital of the World," so living there, I naturally was drawn to homebrewing. After begging my wife to get me a basic starter kit, I was finally able to make my dream a reality.

I started out with pale ale from extract. After I'd made a few more beers, I decided that when I retire from the military I want to open my own brewpub. I knew that to do this, I would need to make the jump to all grain.

I read everything I could find, bought or made all the equipment, and was ready to go. My first batch of porter came out great. My latest batch is a Breakfast Stout, made with oatmeal and coffee. I am hoping it is good enough to enter in the AHA National Competition in April. Ten more days in the bottles, and I'll find out.

I've decided to throw a party, where I will let my friends decide. If the beer is good, I'll go full steam ahead and start thinking of names for my brewery. If not, it's back to the drawing board!

Jon Gagnon
Rockaway Beach, Ore.

Microbrewers should have nothing to hide from their customers.

That's why I believe all microbrewers should put a clear, easy-to-read freshness date in a prominent place on their labels. The Institute for Brewing Studies, a non-profit organization, also supports the education of the brewing community on consumer legible freshness dating.



There's an easy-to-read freshness date on every Samuel Adams.

I hope consumers support the following microbreweries. You can help push for industry-wide freshness dating by calling your favorite microbrewery and urging them to include clear, uncoded freshness dating on each bottle. You'll be doing microbrew drinkers everywhere a favor.

Boston Beer Company, Atlanta Brewing, Broadway Brewing, Brooklyn Brewing, Bohannon Brewing, Casco Bay Brewing, Catamount Brewing, Chicago Brewing, Crested Butte Brewery, Frederick Brewing, Lowell Brewing, New Belgium Brewing, New England Brewing, Old Dominion Brewing, Old Marlboro Brewing, Otter Creek Brewing, Pavichevich Brewing, Potomac River Brewing, Redhook Brewing, Spring Street Brewing, Sudwerk Privatbrauerei Hubsch, Summit Brewing, Wynkoop Brewing.

If we have forgotten any breweries that employ consumer friendly freshness labels, please send samples of the labels (so we can include them in any future lists) to: The Boston Beer Company, 30 Germania Street, Boston, MA 02130.

Our industry exists because we take such pride in the quality of our beer. We use better ingredients, and take great care to brew our beers. Don't we owe it to our customers to be honest about the freshness of our beers?

I believe all microbreweries should join the Boston Beer Company and the other microbreweries listed here in insisting on freshness dating.

Anything less would be incomprehensible.

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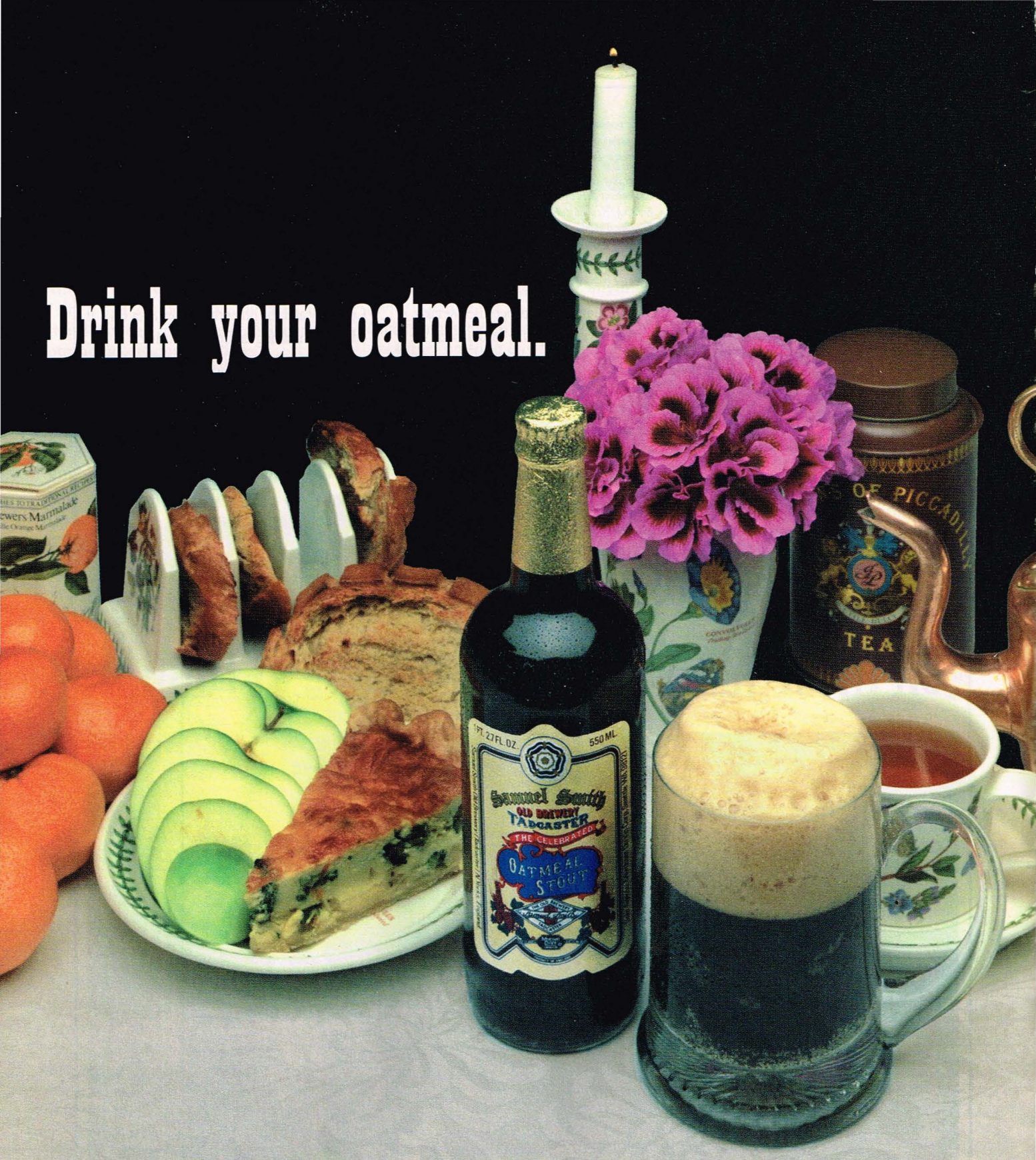
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CIRCLE 44 ON READER SERVICE CARD

Humble Beer Seers

Dear BYO,

I just wanted to let you know how much I enjoy *Brew Your Own*. After each issue I read I begin to ponder what sorts of brewing tips I would like to see in subsequent issues. It never fails that the next issue, magically, has just the answer to my question. Do you have spies out there or what? First it was yeast culturing, then it was kegging, and best of all was an article about calculating the amount of corn sugar needed to yield a specific degree of carbonation. The next article I would like to see is how to make a magic box that will clean my beer bottles without my help.

Paul Seeger
El Centro, Calif.

Thanks for the compliments. We're giving the staff psychics the day off and the engineers are at work!

In Search of...

Dear BYO,

A good friend remembers a malt extract used for cooking that was available in grocery stores in our area about 25 years ago. He brewed a batch in a carboy using it, plain table sugar and Fleischman's baking yeast. Pretty darn good stuff (he says).

In the last few years we have taken up homebrewing using brewer's ingredients and standardized recipes, but he longs to try to recreate that brew. He can't remember the name of the extract. He says there was a picture of a lady on the can, and he thinks the name was Mrs. Paul's. I know that's fish sticks but...

Does anyone have clue?

Liz Watkins
Versaille, Mo.

Readers, any suggestions?

About That Letter

Dear BYO,

I am writing in reply to your reader's plea for information on plastic storage crates (Mail, January BYO). He should consider the following:

1. Plastic milk crates make excellent containers for homebrew bottles.

2. Search through recycling bins for the going-out-of-style 16 oz. soda bottles. I've collected lots of old bottles complete with sturdy plastic or steel-trimmed wooden crates. (I know that the use of clear and green bottles is frowned upon, but the only time my homebrew sees the light of day is immediately prior to consumption.)

3. Look for local soda bottlers that package their goods in screw-top glass bottles. Chances are that these bottles are shipped in plastic or wooden crates.

4. Relax and, by all means, do not worry. When treated with respect (and bottles are dried before crating) major brewers' corrugated boxes will last.

Christopher Pinchiaroli
Valhalla, N.Y.

Brewing Smart

Dear BYO,

I've enjoyed reading your magazine and its various departments, but I must point out that some information being relayed to your readers is very dangerous. The case I am referring to is the Beaver Tail Brewery's "Pot Shot" (January BYO). While this is a fine installation that any homebrewer would be proud to own, the builders have overlooked a serious safety concern. I was horrified to see three outdoor propane burners being used inside a basement. These types of propane burners are meant for outdoor use only! These burners are notorious for generating huge amounts of carbon monoxide, especially at low flame levels.

I hope they do use some kind of ventilation, as well as have a carbon monoxide detector installed.

Karl F. Lutzen
Rolla, Mo.

Avoiding Ground Zero

Dear BYO,

I recently read an article that talked about bottling in two-liter pop bottles. It was very specific about using those with plastic tops because they can take more pressure than the metal ones. Something about "thread depth."

Is this true? I would like to know before I set up a potential munitions dump in my garage. It's one thing to have a 16-ounce hand grenade go off (though it hasn't happened to me yet), but another to have a two-liter blast that would be close to thermonuclear.

Brett Dearman
Tomball, Texas

Plastic bottles are much stronger than glass and can hold much higher pressures. Therefore, it's unlikely you could unwittingly turn them into small bombs. The bottles also have deep thread grooves and can be opened and closed several times before the cap gasket and threads begin to leak carbon dioxide pressure, but metal caps are difficult to reseal because they are easily bent.

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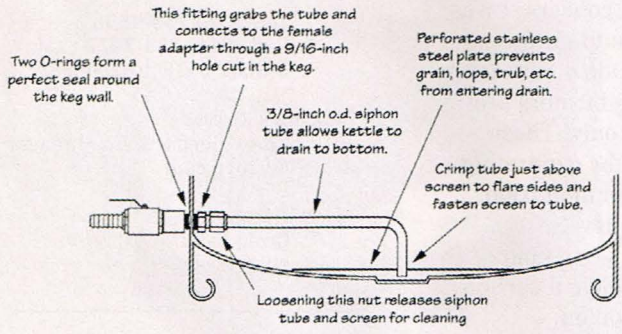
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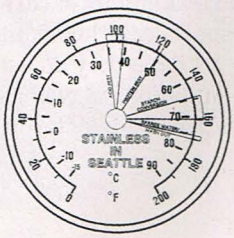


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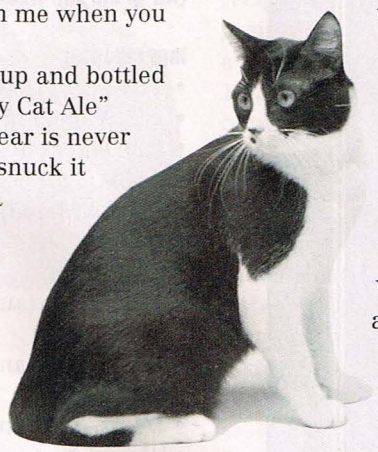
CIRCLE 68 ON READER SERVICE CARD

Be a Scaredy Cat Brewer

by Scott Russell

A good friend of mine, JZ, bugged me for weeks, telling me about this weird brew he was thinking of making — chili peppers, garlic, ginger, and licorice, with kidney beans in the mash as a protein source. I laughed and said, "Yeah, well, keep it away from me when you do make it."

Well, JZ brewed it up and bottled it. He called it "Scaredy Cat Ale" because, as he says, "fear is never boring..." Actually, he snuck it by me, mixed in with a six-pack of stuff, and I tried it. It was golden, crisp, smooth, and full-bodied, with a spicy pungent aroma — like a bowl of chili, but also like ginger ale, and like, well, like a good beer! I was impressed. I haven't yet dared to brew Scaredy Cat myself, maybe someday I will. But it opened my eyes to possibilities. Who says you have to be conventional? If you brew it, they will try it. Or something like that. Maybe someday JZ will give me the recipe and I'll pass it along in this column.



Meanwhile, let's return to the wild, wild west with Gingersmoke! Round up the Marshal and Festus. Yeah, bring Miss Kitty along, too. What do you get when you cross the rich, smooth, smoky aroma of a peat fire with the sharp, brisk spiciness of old-fashioned ginger beer? To me it's an attractive and unusual combination. And it works, in part because the flavors are so different. They really complement and balance each other. And why wouldn't it work? It's homebrew, after all. Sort of like a teriyaki barbecue without the grease.

Brewed and aged cold, this light lager is smooth and refreshing, but it's different enough to write home about. The basic recipe is essentially a Continental pilsner style, although the hops are quite subdued to allow the smoke and ginger to dominate. (Both flavors come through quite well anyway!)

This may be a great brew to put up in champagne bottles and save for a special celebration. Carbonate it well, whether in bottle or keg. Smoked beers tend to get a little heavy if not adequately carbonated. Cheers!

Gingersmoke
(five-gallon, extract/grain recipe)

Ingredients:

- 1/2 lb. two-row pale malt
- 1/2 lb. cara-pils malt
- 1/2 lb. peat-smoked malt
- 3.3 lbs. extra-light plain extract syrup
- 1 lb. light dry malt extract
- 1 oz. Tettnanger hop pellets
- 1/2 oz. Saaz hop pellets
- 1/4 to 1/2 oz. grated fresh ginger root
- 10 to 14 grams dry lager yeast
- 3/4 cup corn sugar

Step by Step:

Before you begin to brew, toast the pale malt at 350° for 15 minutes on a cookie sheet. In 2.5 gallons of cold water, steep the toasted malt along with the other malts. Turn on the heat. Remove grains when water reaches 170° F, place in colander, and sparge with two quarts of water, boiled and cooled to 170° F.

Add syrup and extract to kettle. Bring to a boil. Add Tettnanger pellets and boil 30 minutes. Add Saaz pellets and boil 15 more minutes. Remove from heat and add ginger in a cheesecloth bag as wort cools. (Err on the side of caution: Ginger is a potent flavor!) Add to fermenter and top off to 5.25 gallons with chilled, pre-boiled water.

At 75° F pitch dry lager yeast (or a liquid culture, perhaps Wyeast 2278 or 2007), seal, and ferment three to four days at 65° to 70° F. Rack to secondary and age three to four weeks at 45° F or less. Prime with 3/4 cup corn sugar, bottle, and age another three to four weeks.

All-Grain Option:

All-grain brewers can use a standard Continental pilsner mash recipe. This brew really should stay as light in color as possible for aesthetic reasons.

About Ginger:

I usually use fresh (home-grown) ginger root, but I have also used dried ginger root, which is often available from homebrew suppliers. The latter tends to be a bit more concentrated, so unless you are really into ginger, be careful not to overdo it!

About Peat-Smoked Malt:

I use this because my shop carries it. Any smoked malt can be substituted, or use a preservative and vinegar-free liquid smoke extract from the gourmet/barbecue section of your supermarket. (I prefer the taste of the peat-smoked malt because it reminds me of single-malt whiskey.)

More Recipes

Rick Garvin's Cherry Blossom Wit
(All-grain for five gallons)

Rick says: "The cherry tree was blooming when I made this and the wind kept blowing cherry petals into the boiler."

Ingredients:
- 4.0 lbs. pilsner malt
- 3.6 lbs. unmalted wheat
- 0.4 lbs. rolled oats
- 0.89 oz. Styrian Goldings hops (6.2% alpha) for 60 min.
- 0.36 oz. Saaz hops (3.2% alpha) for 5 min.
- 14.5 grams bitter orange peel for 20 min.
- 35 grams ground coriander for 5 min.
- Wyeast White 3944

Step by Step:

Mash in at 117° F with 20-minute rests at 117° F and 122 °F and a 60-minute rest at 146° F. Mash out to 160°F. Boil 30 minutes before adding the first hop addition. Hint: Do not purée the bitter orange in a blender with water. It will sink to the bottom of the boiler and scorch.

Tony Babinec's Kölsch
(All-grain for five gallons)

Ingredients:
- 6 lbs. US 2-row malt
- 1 lb. Vienna malt
- 1 lb. wheat malt
- 1/4 lb. light crystal malt (10° Lovibond)
- 1 oz. Hallertauer hops (2.9% alpha) for 60 min.
- 1 oz. Hallertauer hops (2.9% alpha) for 30 min.
- 1/4 oz. Tettnanger hops (3.8% alpha) for 15 min.
- 1/4 oz. Tettnanger hops for 2 min.
- Wyeast European ale yeast

Step by Step:

I've assumed 80 percent extraction efficiency. The hop schedule broadly follows the German method, and you can substitute Perle or Spalt hops, and mix and match however you want.

Mash in at 122° F and hold for 30 to 45 minutes. (I follow Fred Eckhardt's description of Widmer's mash sequence.) Then raise to 158° F for starch conversion. Following conversion, raise to 170° F for mash-out and hold for 10 minutes.

Primary fermentation should be done in the mid-60° F. This beer benefits from cold-conditioning, so rack to secondary and "lager" at 40° F for a couple of weeks.

OG: 1.070 FG: 1.020 ■

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Solving A Beer Mystery



Mr. Wizard

A friend of mine asked for information on how to brew a "schwarzbier" and I was unable to find a recipe. I was also unable to find such a beer listed in Michael Jackson's Beer Hunter CD-ROM. Can you tell us what it is and give a few examples and/or recipes?

John Lynch
Laurel, Md.

Schwarzbier is translated as "black beer" and it is a very dark, sometimes opaque lager. Schwarzbier is somewhat exotic, even in Germany, but commercial examples can be found. Kulmbacher Mönschof Kloster Schwarz-Bier and Sapporo Black Beer are not too hard to find. (The Brickskellar in Washington, DC, probably carries one of those.)

I have had schwarzbiers in Germany, and I see them as the lager version of a porter or stout. The dominant flavor adjectives are roasty, coffee, licorice, dry, and rich. I quaffed down a liter of Löwenbräu Vestenberg Schwarzbier in a little Bavarian town called Vestenberg while having a mid-morning brotzeit. The tavern had beautiful wood trim, the beer was delicious, and the smoked bacon and pumpernickel bread was served on a wooden plate. I could have been in Britain drinking a dry stout with some meat and bread.

To brew up a batch of schwarzbier at home, begin by using a dry stout recipe and cutting back on the roasted grains just a bit. The recipe should have a target gravity between 1.048 and 1.052. Also, I would substitute German bittering and aroma hops for those called for in your chosen recipe. If the recipe calls for a large dose of aroma hops, back off since schwarzbiers have a subtle hop nose. The last change, of course, would be to use lager yeast instead of ale yeast. The fermentation temperature should be around 50° F, and then the beer needs to be lagered around freezing temperatures for at least three weeks. This will get you in the neighborhood of schwarzbier.

Mr. Wizard

I have been homebrewing for more than a year and have brewed nine batches of all-grain beer, three of those with a decoction mash. This week I did a decoction mash using nine pounds of lager malt plus special adjuncts for five gallons of wort.

My problem was poor yield (26 points) and poor conversion.

I put 60 grains of the lager malt in a glass of water — 28 grains sunk to the bottom and 32 floated. I chewed the grain and it tasted okay, but I thought it was dry. I couldn't crush the malt with my fingers, and it shattered when I smashed it with a paint scraper.

I bought malt from two homebrew supply stores with the same results. Do you think the malt is very old or not modified or am I doing something wrong? How do I test malt for age? I want to know if I am buying a quality product.

Pat Sexton
Yakima, Wash.

There are many things that contribute to yield, and I will address some of the possibilities. Since you brought up the subject of modification, I will begin with that.

Modification, or the changes that occur when barley is converted to malt, relate to enzyme development as well as the hardness of the malt. Poorly modified malt is harder than well-modified malt and may have fewer enzymes. Hard malt can certainly decrease yield. In commercial breweries multi-roll mills are used to mill hard, undermodified bits of grain finer than the well-modified bits. Basically, the physical input supplied by tight milling makes up for the lack of barley cell wall breakdown in the malt house. You may want to tighten your mill gap a little bit to produce a finer grist; just be careful not to go overboard since you can easily cause other problems, such as a stuck lauter bed.

I've never heard that malt buoyancy relates to modification, but several common malt specifications do. Maltsters carry out many lab analyses on every batch of malt they make, and these specifications are available to the buyer (usually breweries). Sometimes homebrew stores get them. Some typical specifications that relate to modification are the fine/coarse difference, the Kolbach index (known in this country as "S/T ratio" — soluble to total protein), soluble protein, and the acrospire (shoot) length. These all relate to how much enzymatic activity occurred during malting and how much the barley grew on the malt floor.

At home you can cut the grain open and look at the appearance of the malt endosperm and chew the grain to obtain similar information. The endosperm should be chalky white ("mealy"), not steely or gray. A steely endosperm, often found in the tip of the kernel, is a sign of incomplete modification. Hardness is also relevant since steely endosperm is very hard and a

mealy endosperm is easy to crush. This test is usually done using your teeth, not your fingers. These tests are typically performed on pale malt, since specialty malts often have unusual appearances but are perfectly fine.

You might want to explore buoyancy in more detail, because there may be some validity to your observations.

Poor modification is not the only possible explanation for your problem. You mention that the grain was dry — it should be dry. If it were damp or "slack," that may have caused some problems. Old malt is generally not a problem, and if it is a problem it is usually associated with odd flavors, not poor yield. If damp malt is stored, it can pick up musty flavors from mold and mildew growth. But your dry-tasting lager malt probably did not have this problem either.

Decoction mashing, on the other hand, can cause problems with yield and conversion. If you boil the thin part of the mash, you can significantly cripple the mash's complement of enzymes. The thick part of the mash should be boiled for all decoction steps except the last decoction. It's okay to boil the thin part of the mash in this step, since the enzymes used in mashing are no longer needed when "mashing off." If you damage the mash enzymes, then you can expect poor conversion and poor yield. This is the exact opposite of what decoction mashing should do.

You also mention adjuncts in the mash. I am assuming that you mean special malts, but if you used rice or corn, these would cause some problems. They have to be milled very finely to get a good extract yield and run through a double mash, not a decoction. If you did not use rice or corn, then your "adjunct" special malts probably were not the cause of your problems.

My last stab at your puzzle is plain old low yield. If you had good malt and did okay with mashing, then poor yield (lower than reported) can be caused by coarse milling, thick mashes, or less than ideal lautering. These problems are not a big deal. If these did cause your low yield, then just use more malt next time. There is nothing wrong with 26 points per gallon as long as you consistently obtain that yield.

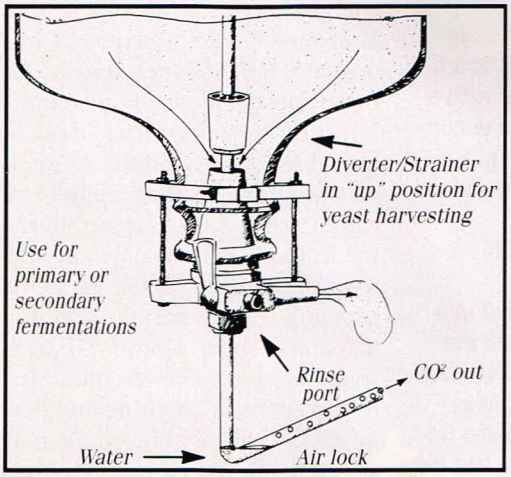
Mr. Wizard

I have been reading a lot about oxygenating wort lately. However, Charlie Papazian's book, *The Complete Joy of Homebrewing*, mentions the option of adding 1/2 teaspoon of ascorbic acid (vitamin C) to five gallons of beer as an antioxidant. Please share your wisdom on the proper use, benefits, and/or drawbacks to using this in homebrewing.

Paul Stasiak
Fireside Brewery
Springfield, Mass.

I've been trying hard to clear up all the oxidation issues and they just won't go away! I'm beginning to think I need another wizard to help me! The message I want to send is that oxidation is not the biggest problem out there. Yes, there are many articles on the subject, penned by well-respect-

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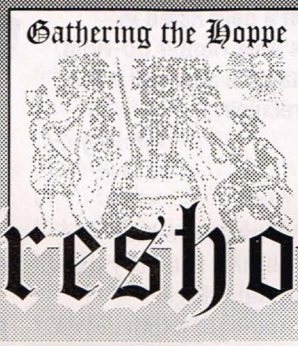
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ed writers, but I think it has gotten carried a little too far.

Commercial brewers consider yeast an anti-oxidant, because it has the ability to seek out oxygen and mop it up. Sierra Nevada, for example, sometimes tastes a little old in remote markets, but it rarely tastes oxidized. They don't have major problems with oxidation because their beers are bottle conditioned. It's not because of super high-tech bottling machines (their's is a used 1960s filler from Rolling Rock), and it's not because their beer is always kept ice cold in a cave below their brewery in Chico. It is due to yeast in the bottle (and, of course, a lot of TLC at the brewery). Since homebrew is usually bottle conditioned, oxidation should not be a major concern.

If you are worried about oxidation, adding ascorbic acid may be helpful. Ascorbic acid is called a "head-space scavenger" by food scientists, because it mops up oxygen in the head spaces of cans. If you add ascorbic acid to beer, it will scavenge oxygen. However, this method should only be used to scavenge head-space oxygen, which is usually present after bottle filling, and not to remove oxygen that has been introduced by sloppy beer transfers. If you added enough ascorbic acid to solve those problems, then your beer would start to taste very sour. In any case, oxygen does its damage quickly, so adding ascorbic acid after the fact would not be very effective.

Papazian does bring up a valid technique to protect beer from the evils of oxygen. The ascorbic acid method quickly minimizes the head-space oxygen gained during filling. The removal of oxygen occurs so quickly that it doesn't have many seconds on the clock to damage beer. Personally, I would rather foam the beer before capping and "cap on foam" (as opposed to capping on air) and go vitamin C-free!

Mr. Wizard

In "Breathe Some Life Into Your Beer" (December '95 BYO) it is suggested that the easiest way to aerate is to "run the wort down the side of the primary fermenter or to let it splash around when pouring from the kettle." In "A Lighter Shade of Pale" (also in December '95 BYO) it was stated that "oxidized wort tends to give the resulting beer undesirable flavors, so it's something you want to avoid. That's one of the reasons you don't splash the hot wort around if you can avoid it." Before I attempt to aerate my next batch of homebrew, I would like to know where you stand on the subject.

One last question about "Lighter Shade": If you just happen to have a spectrophotometer sitting around in your basement, how would you go about determining your homebrew's Lovibond rating?

Ben Fisher
Gaithersburg, Md.

This is an easy one since there is no contradiction in these two quotes. You left out one very important part in the quote you pulled from "Breathe Some Life"! The complete quote from the article is as fol-

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lows: "[the easiest way] to aerate the wort *after cooling* is to run the wort down the side of the primary fermenter or to let it splash around when pouring from the kettle." Wort aeration after cooling, whether by letting it flow down the side of the fermenter or pouring cooled wort from the kettle, is not going to cause oxidation, but it does aerate the wort. "Lighter Shade" specifically refers to wort oxidation caused by splashing hot wort, not cooled wort. For more information on aeration versus oxidation, check out February's Mr. Wizard.

I do take issue with the idea that oxidized wort (hot wort that has been splashed around) leads to off-flavors in finished beer. As I pointed out in the October '95 BYO, many breweries do indeed splash hot wort around and produce clean, high-quality, defect-free beers in spite of the practice. This subject is up for debate, but I think it has provoked more concern than is needed.

If you're lucky enough to have a spectrophotometer sitting around in your basement, the first thing to do is to make sure it is working, since a bad detector or burned out lamp can cause some difficulties. If it's okay, you're in business to determine beer color. The ASBC (American Society of Brewing Chemists) method reports color in SRM (Standard Reference Method) units that are based on the old Lovibond scale.

The method is really easy. First, clarify your beer sample (hazes cause erroneous results). The recommended method of clarification is to put a little diatomaceous earth in the beer sample and filter or centrifuge it. Transfer the sample to your spectrophotometer cuvette and measure its absorbance at 430 nanometers and at 700 nm. If the absorbance at 700 nm is equal to or less than 0.039 times absorbance at 430 nm, the beer is considered "free of turbidity." If the beer is not free of turbidity, then you need to clarify it more. After clarity is achieved, record the sample's absorbance at 430 nm. SRM color is simply 10 times this absorbance.

The method specifies a 1/2-inch path length (inside width or diameter of cuvette). So if you use a larger or smaller cuvette, you must proportionally scale the SRM value down or up. For example, if you use a 10-milimeter cuvette, you must scale the color up by a factor of 1.27, since 1/2 inch is 1.27 times longer than 10 mm. The absorbance measured in a 10-mm cuvette will be less than the absorbance of the same sample measured in a 1/2-inch cuvette by a factor of 1.27. ■

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. You can also reach him by e-mail at wiz@byo.com.

Appalled at being impersonated by a short, bald guy behind a curtain, Mr. Wizard moved away from the emerald city and into the brewery. He does still dole out the occasional heart or brain to deserving zoo animals.

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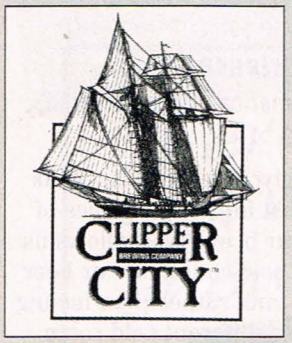
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CIRCLE 3 ON READER SERVICE CARD

Equipment That's Worth the Investment

by Gailen Jacobs

If you won a shopping spree at your neighborhood homebrew store, what would you grab first? Three pros sound off on their favorite and most important pieces of equipment and offer advice on what should top your shopping list.



Clipper City Brewery
Brewer: Tom Flores

"The most important piece of equipment for a homebrewer, both to invest money in and learn how to use correctly, is a lauter tun, or a combined mash/lauter tun."



Great Basin Brewing
Brewer: Denise Jones

"I think an all-grain mash system improves beers more than any other piece of equipment...Another good item is some sort of quick wort chiller."



Capital Brewing Co.
Brewer: Kirby Nelson

"If a homebrewer is going to invest money in just one item, pay very close attention to the fermenting/aging vessels. They need to be the type that can easily be kept very clean and sanitary."

Brewer: Tom Flores
Brewery: Clipper City Brewery, Laurel, Md.
Years of experience: Six
Education: M.S., Food Science, UC Davis

The most important piece of equipment is something you can't buy: your palate. That is the one thing that you simply can't do without in beer-making. You can have the fanciest lauter in the world, the best kettle, the best-designed mash mixer, superior grain-handling equipment, delightful tanks, and all of that, but if you don't use your senses to be in touch with what's happening in the process, then you're lost.

While all the equipment you can actually purchase is important, one that I have a lot of fun with is the lauter. The other equipment isn't quite as complicated. Our mash mixer and kettle are pretty straightforward. With the tanks we have to make sure the temperature and volume are right, but other than that they're dumb tanks that just sit there. So much goes on in the mash. It's such a complicated process, and it's so important. It's constantly changing, always giving you something to think about and respond to. The lauter tun really is the most fun for me.

I can't say which piece of equipment is the most important in a

professional brewery because it depends on the day. If something goes wrong, it is the most important thing. If you want to chill your wort and your glycol system goes down, then that is the most important piece of equipment. Our keg machine and bottling machine are not operational yet, but I have a feeling that they are quickly going to require the most attention. Homebrewers don't have to worry about that.

The most important piece of equipment for a homebrewer, both to invest money in and learn how to use correctly, is a lauter tun or a combined mash/lauter tun. One reason is typically homebrewers do not have a reliable way to test fermentability other than taking a sample and throwing a bunch of yeast at it. If your mash temperature is correct and your extractions are done efficiently, you have a lot better chance of getting a really good wort that yeast will enjoy.

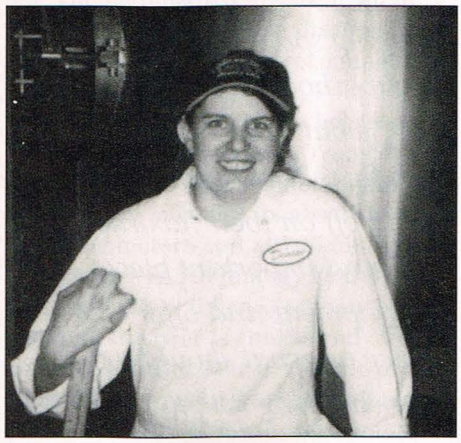
You can use any kind of kettle — some people use a big pot, others use a keg with the top cut off. You can have the best-designed kettle, but if you have no way of controlling your mash temperature or getting all that extract out of the grains, then having the best kettle, the nicest carboy, and even a temperature-controlled room isn't going to do you a whole lot of good.

Brewer: Denise Jones
Brewery: Great Basin Brewing, Sparks, Nev.
Years of experience: One
Education: American Brewers Guild,

I think the glycol-jacketed unitank is one of the most important pieces of equipment in our brewery. It allows us to ferment and cold condition our beer all in the same tank rather than having to transfer it to a different cold room. Because our brewery is really small, we don't have the capacity to be transferring it around, risking contamination from one vessel to another.

There are a lot of different pieces of equipment that I think are really important in our operation. Our filter is a really important piece of equipment because it saves us quite a bit of time in lagering and cold storage by filtering the yeast out. I also think our single-infusion mash tun is really important because we can get the type of malt flavors and characteristics that most extract brewers can't come up with.

Many homebrewers start with extract brewing. Once they become



Denise Jones

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The Tips

Tom Flores

- **Favorite equipment: Lauter tun.**
- **Why? "So much goes on in the mash...It's constantly changing, always giving you something to think about."**
- **Last minute advice: Learn how to use the equipment correctly.**

Denise Jones

- **Favorite equipment: Glycol-jacketed unitank.**
- **Why? It eliminates the need to transfer beer to a cold room, reducing the chance for contamination.**
- **Last minute advice: Invest in an all-grain mash system or wort chiller.**

Kirby Nelson

- **Favorite equipment: The brain.**
- **Why? You rely on your brain to get the right equipment and use it correctly.**
- **Last minute advice: "Constant analysis...will make you a better brewer and give you better beer."**

confident, they start to do some grain infusion with the extract. I think an all-grain mash system improves beers more than any other piece of equipment. A lot of homebrewers use a double boiler/colander system. Even a mash system this simple helps them get the more complex malt characteristics and malt flavors from the mash. It's a big improvement over what you can get from a can.

Another good item is some sort of quick wort chiller. Depending on the stage of homebrewing, a wort chiller can make a big difference in the quality of the beer. The wort chiller cuts back on contamination because it allows homebrewers to get their wort in the fermenter and on yeast a lot quicker, rather than leaving it outside all night long to cool down by natural elements.

Brewer: Kirby Nelson
Brewery: Capital Brewing Co., Middleton, Wis.
Years of experience: 17
Education: On-the-job training

In all seriousness the most important piece of equipment in our brewery is my brain.

You have to use your head in a brewery more than anything else. What we do is basically very, very simple, it's just that a hell of a lot can go wrong in it. Again, you have to use your head to get the right type of equipment, use it in the proper way, and handle the sanitation. When you do the formulation, you must make adjustments in your formula for changes that nature makes, such as yeast performance and taste.

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CIRCLE 14 ON READER SERVICE CARD

The History of Cider 101 Professor Marmota Monax

Chapter 3: Woodchuck Ciders Declared "World's Best"

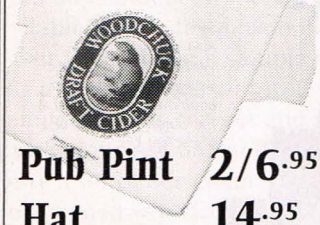


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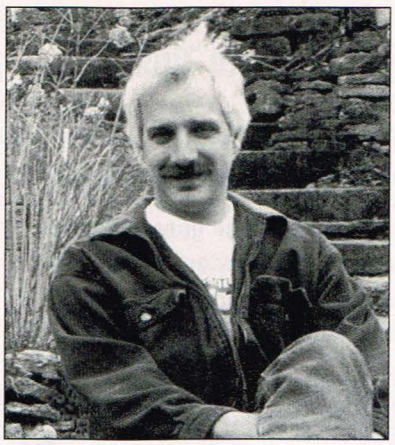
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Ask About Our Homebrewer Weekends

CIRCLE 4 ON READER SERVICE CARD



Kirby Nelson

for a while and is not quite happy with his beer, he should research it to find out what step of the process needs work to improve the beer. Constant analysis, exercising your brain, will make you a better brewer and give you better beer. Do research, talk to more experienced homebrewers, read books and magazines.

There are a lot of questions when it comes to choosing and purchasing equipment. Regardless of how much money you are spending, you shouldn't try to save money by getting a piece of lousy equipment.

Let's say someone is trying to sell you a fermenting tank relatively cheap. Look at it. Is it a proper grade stainless? Is the interior cracked? Will it leak? Does it hold pressure?

When it comes to brewing equipment, get the best that you can afford. Never try to get by on the cheap if you don't have to because you'll pay for it in the long run in one way or another. It's true: You get what you pay for. Talk to people before you buy equipment. Not just the guy whose trying to sell it. Get a few other opinions.

While every piece of equipment is important, if a homebrewer is going to invest money in just one item, pay very close attention to the fermenting/aging vessels. They need to be the type that can easily be kept very clean and sanitary. ■

More Tales of Stout

by Jeff Frane

The toughest part of this job is the research. Those of us approaching middle age (I am planning to live to be 100) can no longer rely on memory, especially when discussing beer. We have to get fresh input. We have to get out there and actually taste some beer. It's brutal.

So before I started my column on dry stouts, I set out in search of research. Fortunately, Portland, Ore., (my home) is a good place for me to refresh my memory. We have at least one pub, the County Cork, where it's possible to taste Ireland's three great stouts side by side. I dragooned my wife, Elizabeth, to lend her fresher palate (and sharper memory) to help me. After all, she did take a vow — something about thick and thin, rich or poor, porter or stout...

Never having visited Ireland, this has to be the next best thing. Three evenly (and properly) drawn glasses, all with the creamy, insistent heads driven by a nitrogen-CO_2 mix. Good cellar temperature. There were Beamish, Guinness, and Murphy's brooding darkly next to the Scotch eggs and Ploughman's lunch.

"Guinness is Goodness" has been a corporate motto since the 1920s, and it's easy to believe that anything so dark, bitter, and creamy must have restorative powers.

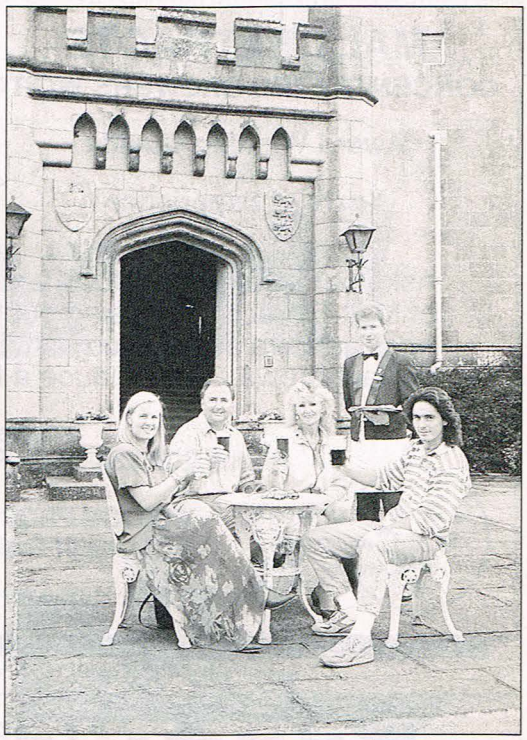
In general I am not a stout drinker, but there are times when nothing else will do, especially on cool winter evenings. My reaction to good stout is always the same: an initial doubt (was this really what I wanted?), then the gradual realization that nothing could be better. Thus follows an evening of good stories, laughter, and a few restful pints of stout.

"Guinness is Goodness" has been a corporate motto since the 1920s, and it's easy to believe that anything so dark, bitter, and creamy must have restorative powers.

What struck me first in the County Cork, however (hey, this was research), was that I had a problem — how to define stout in contrast with porter. Other research, through Jackson, Eckhardt, et al, was no more helpful. After all, stout is a subset of porter, and these three beers (all at about 1.039 to 1.040 specific gravity) are in no way distinguishable from a good, traditional porter. They are surprisingly light in body because they are very dry, almost black in color, and with a good dose of bittering hops (particularly the Guinness). Roasted grain was evident in each, although its predominance varied among them — just like good porters.

At this end of the stout spectrum, the distinction is patently false. "Stout" porter was a term coined by Guinness in the early 1800s to distinguish one of their porters from another. To this day, there is some confusion about the use of the "stout" label, with Anchor's Porter, which most drinkers would call a stout, and feeble brewpub "stouts" of little character.

Part of the problem is that "stout" covers such a vast range. While Guinness Draught (1.039) defines one end, what defines the other? Even the giant Irish firm itself brews a wide range of variations, up to their Foreign Extra Stout (1.073). Many other brewers offer their own versions.



You don't have to go to Ireland to enjoy stout, but a setting such as the Dromoland Castle in County Clare somehow enhances the flavor.

Given their contrast to the debased global "pilsner," which dominates the beer trade, the survival and proliferation of stouts worldwide is amazing. Guinness has been aggressively marketing its beer for more than 200 years, even establishing satellite plants overseas. Michael Jackson credits the Irish diaspora (migration) during the potato famine of the 1840s and the use of Irish mercenaries in the last century as helping to spread the fame of stout.

What most amazes me is the tremendous appeal of stouts in the tropics. A beer originally poured for the cool, misty islands of the north seems an unlikely choice for the heat and humidity of the Caribbean or

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Blarney Stone Stout
(5 gallons)

Ingredients:

- 7 lbs. pale malt (English ale malt is great)
- 1 lb. flaked barley
- .75 lb. British (or Belgian) roast barley
- 1.5 oz. Northern Brewer hops (8% alpha) *or* 1 oz. Target (10% alpha) at 15 minutes
- Optional: .5 oz. Goldings hops at 30 minutes
- Yeast

Step by Step:

Mash in at 122° F for 30 minutes, raise to 150° F for 60 minutes. Sparge to six gallons and boil 90 minutes, adding hops as noted.

Aerate thoroughly, pitch a healthy ale yeast (see text), and ferment at 65 to 68° F. Rack to secondary when krausen falls, and follow normal bottling or kegging procedures.

OG = 1.040
TG = 1.010

Southeast Asia, but stout proliferates as wildly there as native plants. Not only has Guinness thrived in these locations since colonial days (both exported and brewed there) but most breweries from Sri Lanka to Jamaica produce a competitive brew.

One of the best stouts I've ever had was Malaysia's ABC Stout, a bottle conditioned, creamy, rich brew at 1.073. (Rumor was that we drank the last case of this beer in the late 1980s, as the brewery switched to filtering and dropped the original gravity by more than 10 points. Sad news, indeed.) Another favorite is Sheaf Stout (once Tooth's) from Australia,

Foreign Legion Stout
(6 gallons)

Ingredients:

- 12.5 lbs. 2-row pale malt
- 1.5 lbs. British caramel malt
- .5 lb. home-toasted malt (to toast malt place it on a cookie sheet and roast at 300° F for 1 hour)
- .75 lb. British black malt
- .25 lb. roasted barley
- 1.25 lbs. flaked barley
- 3.5 oz. Bullion hops (9% alpha) after 30 min.
- 1.5 oz. Kent Golding (4% alpha) after 90 min.
- Yeast

Step by Step:

Mash in at 130° F for 30 minutes, raise temperature to 154° F for 60 minutes. Sparge to 7.5 gallons. Boil for two hours, adding hops as noted. Follow normal fermentation and bottling procedures.

OG = 1.072
TG = 1.012

land of tedious lagers.

Throughout the world, the mystical properties of stout persist, whether it's being called an aphrodisiac in the Caribbean or the hot side of the yin/yang balance in Asia. There must be something to it.

A number of very good dry stouts are brewed in the US, thanks to the microbrewery revolution. Here in the Northwest we are particularly lucky, with excellent versions (at least on draught) from BridgePort, Full Sail and Pyramid, among others.

Pursuit of the perfect homebrewed Guinness clone is akin to pursuit of the Holy Grail, and rumors and "secrets" abound. Whether it is a perfect match or not, an excellent homebrewed stout is well within the reach of any conscientious brewer.

As always, the keys are good ingredients and careful sanitation. The ingredients vary, even at Guinness, although a fine pale malt (or best malt extract) serves as the base. Traditional Guinness Draught uses flaked barley and roasted (unmalted) barley, while Beamish includes chocolate malt and malted wheat. Murphy's uses both chocolate malt and roasted barley.

The flaked barley and malted wheat are included to enhance the creaminess and head retention of the beer, while the chocolate malt or roasted barley adds the essential color and acid bite so typical of stout.

Some of the bigger stouts gain

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their strength and richness from the use of the darker caramel malts. Good black malt is likewise a valuable addition.

The two biggest pitfalls for the novice stout brewer are an overly heavy hand with roasted malts, and roasted malts that have been brought to a boil. It takes very little roasted barley (at 500° Lovibond in color) to make a beer black and not much more to render a beer unpleasantly acidic. American roasted malts are particularly prone to this. The better, more expensive British malts are well worth the added expense.

Stouts, even the richest, are bitter. High-alpha hops are a boon to the brewer here. Bullion, Northern Brewer, or Target hops can be considered "traditional," but any of the newer American varieties (such as Columbus) are good for experimentation. Hop flavor is secondary in stouts, but some high-quality English hops (especially Goldings) are sometimes present in the background.

Very hard water is generally considered unsuited to stouts and should be treated accordingly. Moderately carbonated water is best, and soft water benefits by additions of calcium carbonate ($CaCO_3$).

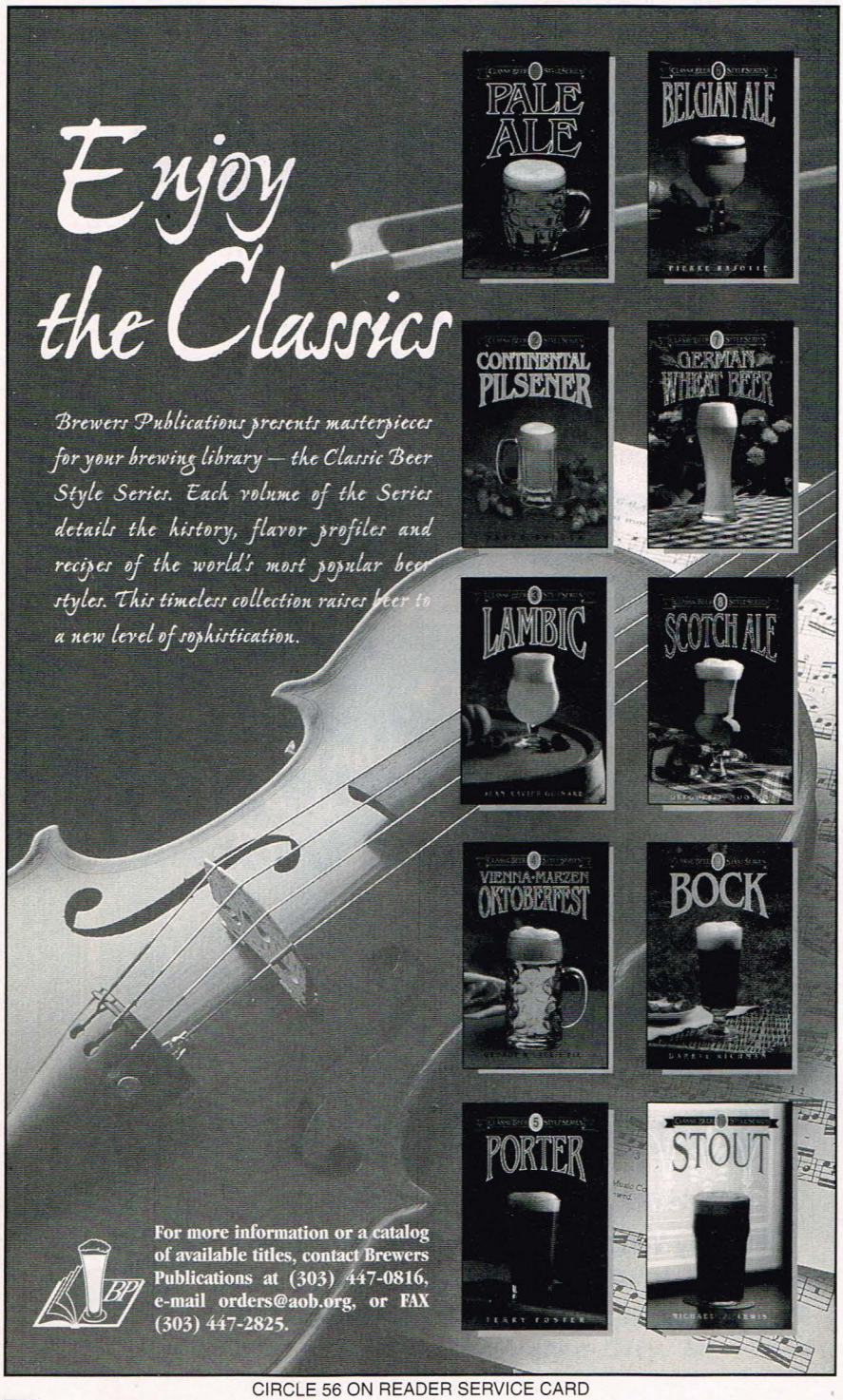
All of today's yeast suppliers offer good choices for dry stout, including Wyeast 1084, Brewtek CL-240, Yeast Lab A05, or the Yeast Culture Kit A13. A good strain should be fruity, attenuative, and aggressive.

I've included two basic stout variations in the recipes. One is a traditional draught version, at about 1.040 OG. The other is a much bigger, stronger version, suitable for bottling and laying down. A beer like this improves markedly with several months of aging, gaining character new beer simply cannot achieve. (I've tasted versions of this beer that have been "lost" in the cellar for a couple years that were absolutely superb — make enough to put some aside!)

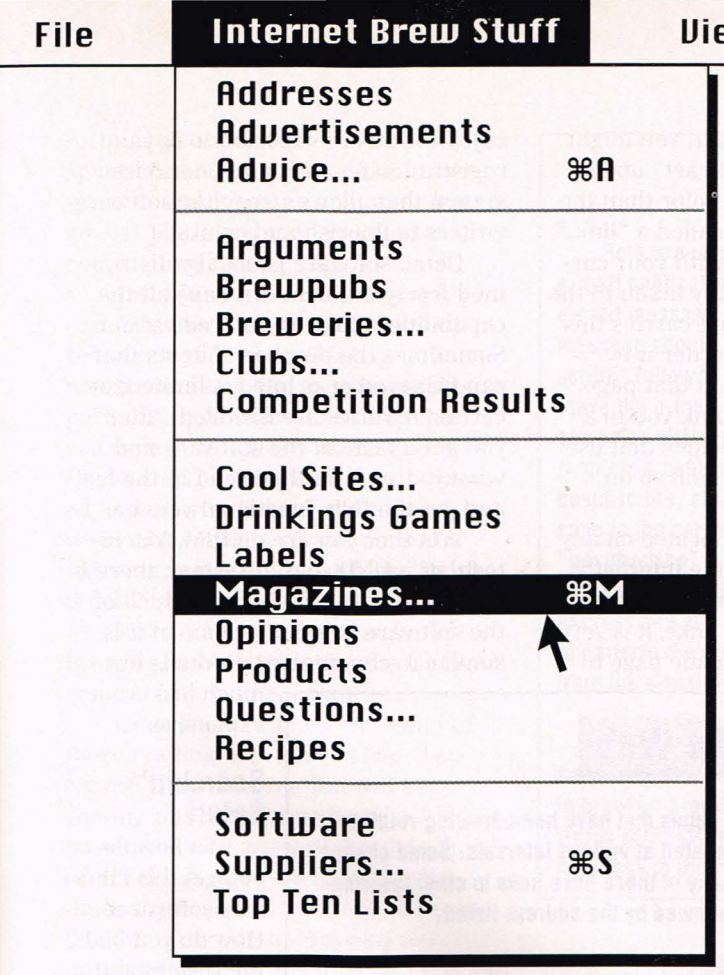
Extract versions of the recipes are straightforward, substituting malt extract roughly 1:1 for most of the pale malt. A small mash, however, consisting of a few pounds of pale malt and the adjuncts (flaked barley and any caramel malts) is almost essential. If the full wort cannot be boiled, the bittering hops need to be increased proportionally.

Whatever you do, don't chill your stout to death. A cellar temperature in the high 50s or low 60s is great and allows flavors to emerge (of course, that's true with all good beer). The Draught Stout is a natural for a kegging system, and if you can pick up a nitrogen-CO_2 mix from your supplier, you'll reach stout nirvana. ■

Jeff Frane lives in Portland, Ore. A graphic designer by trade, he is currently working on an idiot-proof guide to all-grain brewing. He can be reached by e-mail at jfrane@teleport.com.



CIRCLE 56 ON READER SERVICE CARD



Virtually Beer

Cruising the Brew Stops on the Information Superhighway

by John R. Naleszkiewicz

Imagine a place where you can chat with fellow brewers, trade advice, gather recipes, learn more about brewing, visit microbreweries and brewpubs, read beer publications, and get the latest news on new beer releases. A place where you can zip from Plsen to Burton-on-Trent to Portland in the blink (or two) of an eye. A place with all the comforts of home and where you don't have to worry about drinking and driving.

That place exists. All you have to do is rev up the computer, switch on the modem, and strap yourself in for a cruise on the Information Superhighway. Don't forget to press the turbo button!

Signing On

"Information Superhighway" is just a catchy moniker for the Internet, the electronic doorway to computers and computer users around the world. Use of the Internet has exploded in the last few years. Current estimates show that there are more than 38 million users worldwide. Some estimates predict that there will be more than 100 million host computers with Internet connections by the year 2000. Others say the Internet is the '90s version of the CB radio and that it will fade away. Either way it's an exciting medium, and all you need is a computer, a modem, some inexpensive software, and an access phone number — called a gateway — to hop on board.

Use of the Internet is free, but user access to the Internet is not necessarily free. There are many commercial Internet providers that offer a phone number and dial-up access that will get you onto the Internet. You actually use your computer to call their computer, which has a link to the Internet. In these cases you are not paying for access to the Internet but rather for the equipment and overhead of the Internet gateway provider.

You can subscribe to one of the big providers such as America Online, CompuServe, Prodigy, or eWorld. All of these services provide interfaces to the Internet. Once you are a subscriber, you can automatically access the Internet.

The down side to this way of connecting is the cost. It is quite a bit more than you'll pay to a local company that can give you access with less hand holding.

The advantage of using these services for Internet access is that they provide a graphical user interface that is extremely easy to learn and use. If you have young children, they could manage easily. If you don't need all the pictures to find your way around (and if you can read a beer recipe, you are more than capable), a local company can get you set up and keep your bills way down.

Another thing the big providers offer is their own "forums" where subscribers can gather to exchange information and ask questions.

Big providers have built-in "browsers," the software that makes it easy to peruse the Internet. Some local services provide browsers. Otherwise, you can get one of the commercial products such as Netscape or Mosaic, which can be purchased or downloaded free.

Surfin' Safari

One of the most popular services available on the Internet now is the World Wide Web (WWW or "the Web"). The Web combines good-looking graphics and easy access. As the Web has become more accessible and popular, businesses have started to pay attention. In ever-more competitive bids to grab your attention, homebrew suppliers, breweries, brewspapers, even your favorite brewing magazine have put out pictures and information on the Web. The little guy has not been left out. The growing ease of creating a Web page means that many users who are not looking for profit can also post valuable information and recipes for public access.

The Web consists of individual "home pages" that can be linked together. On a page with a recipe that calls for a particular malt, you might find the words "malt extract" underlined and in a different color than the rest of the text. This is called a "link." When you hit that link with your cursor, you are automatically taken to the home page of a shop that carries this malt. Perhaps you can order it by filling out a form right on that page. That page in turn may link you to a magazine with more recipes that use the company's extract...and so on. You're off and running.

Home pages can be located on any computer connected to the Internet. Because home pages are commonly interconnected through links, it is very easy to jump from one home page to another home page. It makes no difference if the first is in Nebraska and the next is in Europe or Asia. The connection takes place automatically, all within a matter of seconds. Jumping around from one home page to another is what has come to be called "surfing the 'net."

Free Stuff

You can find both software programs and text documents on the 'net. There are several different types of software programs available: freeware, shareware, and demonstration ("demo").

Freeware is just what it sounds like — free for everyone. Shareware is software that is distributed with a free trial period. If you use the program and enjoy it, you are expected to pay the registration fee. It is an honor-based system that allows struggling software writers to flourish and continue.

Demo software is usually distributed freely but does not have all the capabilities of the registered version. Sometimes the number of items that can be saved or printed is limited, or certain features are disabled. After you get a taste of the software and what it does, you then send in the fee and get the fully functional version.

Whether you are on IBM, Macintosh, or a UNIX-based system, there is sure to be software for you. Much of the software is unique; some of it is similar to commercial products but much less expensive.

Searchin' Safari

So how do you get this fabulous software? How do you find the recipes and information? Two important words for any web surfer are "Search Engine." You may have heard of Yahoo (www.yahoo.com) or Webcrawler (webcrawler.com), and it is important to realize that you have not been set down in this foreign cyberworld without a map.

These search sites transform a confusing array of possibilities into an orderly list of categories. Step one for any homebrewer new to the Web: Point your browser to Yahoo. Choose "Recreation," then "Hobbies and Crafts," then "Homebrewing." You will be given an array of interesting sites to visit, all in line with what you're looking for. Or for a pot luck selection, go to the search line and type in "brewing" and see what comes up!

If you are interested in finding beer recipes, you're in luck. The Cat's Meow features 460 recipes for beers ranging from alt to weizen. Other brewing recipe lists are available,

Brewing on the Web

The following is a list of World Wide Web home pages that have homebrewing-related information. Home pages are maintained and updated at various intervals. Some change weekly, others will go unchanged for months. Many of these have links to other brewing-related home pages. To find them, type *http://* followed by the address listed.

Home Page Title	WWW Address
***Brew Your Own* Magazine**	**byo.com/BYO**
American Brewer's Guild	mother.com/abg
Association of Brewers (AOB)	**www.aob.org/aob**
The Beer Page	www-personal.umich.edu/~spencer/beer/
Glenn Tinseth's Hop Page	**www.teleport.com/~gtinseth/index.html**
The Real Beer Page	realbeer.com
The WWW Virtual Library: Beer & Brewing	**www.mindspring.com/~jlock/wwwbeer.html**
Cat's Meow III Homebrew Recipe Database	alpha.rollanet.org/cm3/CatsMeow3.html

including recipes that call for using the spent brewing grains and the leftover yeast to make breads and other baked goods. There are even recipes for cooking and baking with beer.

If you have an e-mail account, you can subscribe (for free) to newsletters related to your area of interest. These newsletters are sent to your mailbox periodically and automatically. An example of this is the Home Brewer's Digest (HBD). This newsletter is created and distributed several times a week and consists of questions and answers under topics such as "Help! Stuck Fermentation!"

Other mailing lists cover lambic brewing, homebrewing in the UK, and general interest beer topics.

Once you've signed on to one of these mailing lists (also called "listserves"), the information will keep coming until you "unsubscribe." If you have an e-mail account that has limited server space, be warned: Sometimes these newsletters send a great deal of information. Make sure to unsubscribe before you go on vacation!

Listserves

Here are some free brewing-related e-mail publications. To subscribe send an e-mail message to the server address. The message should contain the word "subscribe" followed by your full name. You can leave the e-mail subject line blank, or you can enter a single space if your system requires a subject. When you want to unsubscribe, simply send a similar message to the server address with the word "unsubscribe" followed by your full name. The list server will get your Internet address and any other information it needs to perform the requested task automatically from the e-mail header.

• BOP Speak Easy. Address: tcel-list-server@tcel.com Discusses issues related to brew-on-premises facilities. Include the words SUBSCRIBE BOP <your email address> in the text of the message.

• Homebrew Digest. Address: homebrew-request@hpfcmgw.fc.hp.com. Discusses a wide variety of homebrewing topics and answers specific questions. Published every two to three days.

• Homebrewing in the UK. Address: uk-homebrew-request@rhbnc.ac.uk Similar to the Home Brewer's Digest except that it centers on homebrewing in the United Kingdom.

• Lambic Digest. Address: lambic-request@longs.lance.colostate.edu Discusses topics related to brewing lambic-style beers.

• Wired for Beer. Address: rrwave@ix.netcom.com Of interest to the general beer lover. Discusses homebrewing, collecting, and other beer-related topics.

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Commercial Services

Here are some brief descriptions of the homebrewing forums available on the major providers.

America Online

America Online (AOL) provides support for IBM and Macintosh computers. Homebrewing information is included as part of the "Food and Drink Network Forum" under Beer. They have four main features: Beer and Brewing Message Boards, All About Beer Magazine, BrewBase/World Beer Championships, and Beer and Brewing Files from Members. Among the most interesting parts of the forum are the beer and brewing files from members. AOL also has a mirror site on the web at mirror.aol.com. That allows you to access many AOL features without being a member.

CompuServe

CompuServe provides extensive information to homebrewers. It is accessible to both IBM and Macintosh computers. The "Bacchus Wine Forum" houses the homebrewing files. The following categories are available: Beers and Breweries, Beer Tasting, General Homebrewing, Technical Homebrewing, Beer Recipes/Styles, AHA/Zymurgy/Clubs. The General Homebrewing category contains lots of informative tips for the beginning homebrewer. CompuServe also provides access to archived Homebrew Digest files. Each of the homebrewing categories has separate areas for messages and related programs.

eWorld

Currently, eWorld provides access for Macintosh computer users only. However, many of the eWorld forums, including the one dealing with homebrewing, are scheduled to move to the Web (accessible to everyone) this spring. Their "Beer and Brewing Central" is large enough to be an entire forum of its own. It has four main areas: Industry Connection, Homebrew Central, North American Guild of Beer Writers, and a live discussion conference room called The White Horse Pub. "Homebrew Central" currently contains discussion groups on a wide variety of topics and a software library. The software library contains about 50 files including both programs and documents.

Prodigy

On the Prodigy system, homebrewing has a section all to itself. Their "Beer" forum features categories on Tech Notes, Travel, Homebrew, Brewers, Periodicals, Fun, Individuals, and more. Prodigy offers "Cool Beer Site of The Week" information and search tools to help you find what you're looking for. They can send you either Macintosh- or IBM-compatible software, depending on your needs.

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Newsgroups

Another source of information about homebrewing can be found in the Usenet newsgroups. The Usenet ("User network") is a collection of discussion groups on various topics. Information is posted much like on a bulletin board. The messages are given short descriptions and users can read and/or respond to any of the posted messages.

These are useful places to go when you have specific questions and don't know where else to turn. The discussions there are every bit as lively as those going on in the more expensive "forums," and there are lots of brewers on line willing to take the time to help "newbies" with brewing questions.

You'll also catch some healthy debate on topics that range from the best microbrew to the worst extract kit.

Among the newsgroups you'll want to check out are rec.crafts.brewing and rec.food.drink.beer (both are general-interest beer forums), as well as alt.beer, which looks at microbreweries, beer tasting, and many other general-interest beer topics.

A Complication

So you're on the 'net. You've found a program or some information you'd like to have on your home computer. Now what? If you are on the Web, it can be as simple as clicking on the item you want. Then, depending on the speed of your modem (whatever it is, it never seems fast enough), you wait for it to download.

The other method, FTP (short for File Transfer Protocol) is more complicated. Learning to use it and navigate through directories can be slightly confusing, but it can be made easy by some helpful software (called a "client"). For the Macintosh, one invaluable program is called "Fetch" and can be downloaded from a number of places. For IBM users "wsftp" can also be found all over the web. If you are looking for a good place to download software, the Virtual Library at c/net central is terrific; visit them at www.cnet.com.

Viruses

If you are downloading a lot of stuff from the Internet, you might want to protect yourself against computer viruses. While most Internet sites have built-in anti-virus programs that keep their sites clean, there's no guarantee. Prevention is the best course of action.

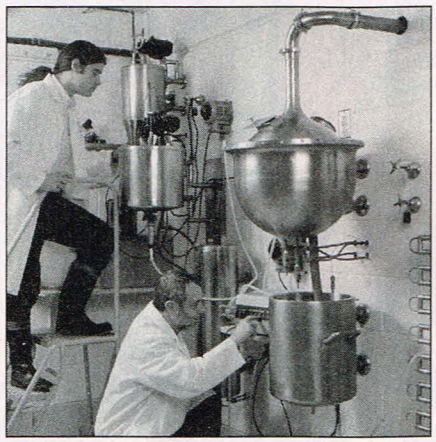
There are several high-quality virus checkers (such as Norton Anti-Virus) available both commercially and as shareware that help prevent computer viruses from getting into your system. It is well worth the investment.

Start Surfing, Dude!

The information age is here, even for a craft as old as homebrewing. Ignore skeptics and forge ahead! There are great recipes, calculators, products, and more just waiting to be found amid the chaff.

Besides, rumor has it that there is a lot of non-brewing information on the 'net too. Hard to believe that anyone would have other interests...

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10 Good Brewing Questions, Answers Included

By Sam Wammack

How Long Should Beer Ferment?

This is the most common question of all, and many homebrewers are confused by books and recipes that give definite times for fermentation. There are too many variables to say that a batch of beer will ferment for only three days or for exactly seven days. Beer usually doesn't follow a printed timetable and when it doesn't, folks get worried. Fermentation time is affected by temperature, the yeast strain used, the amount of yeast pitched, the specific gravity of the wort, water chemistry, and many other factors. The proper answer to this question is: Beer should ferment until it's done!

Here are two guidelines for determining fermentation time. First, beer is ready to rack (siphon) into a secondary

fermenter when the active primary fermentation is done. Primary fermentation is done when the foam (kraeusen) has dropped from the surface of the beer. Pull the stopper and airlock, then squint through the hole. If you can see the surface of the beer instead of solid foam, it's ready to move to the secondary.

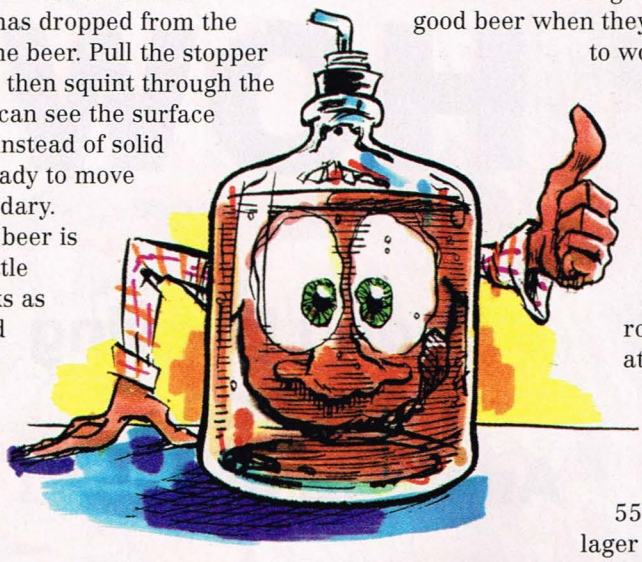
Second, beer is ready to bottle when it looks as clear as iced tea. At bottling time it should be still, flat, and clear.

You can check the beer with a hydrometer to make sure it's done, but at room temperature it is easy to tell whether beer is finished by its appearance in the carboy.

Temperature has the biggest effect on the length of fermentation. The temperature of the liquid is much more important than the temperature of the room the beer is in, because it takes a long time for five gallons of liquid to assume the temperature of its surroundings. If you pitch yeast into wort that is 85° F (not recommended), you may miss seeing the entire fermentation. At that temperature the fermentation may be done overnight, and the brewer often thinks his yeast never started. Those little yeasties get excited when they're warm!

Why Can't I Pitch Yeast at a Higher Temperature?

Homebrewers often misunderstand the relationship between yeast and temperature. It is not true that ale yeast "like" room temperatures and that lager yeast "like" the cold. All beer yeast really "like" to be about 90° F for their own metabolism. At that temperature the yeast really go crazy. They make lots of yeast, eat lots of sugar, and make really bad beer as a by-product. A hot fermentation will be finished in a few hours, but the yeast get too excited when it's hot and put all kinds of strange-tasting compounds in your beer. That's why a hot fermentation is to be avoided.



Both ale and lager yeast make good beer when they are forced to work much colder and slower than they want to. Both kinds of yeast can make good beer at room temperature. Ale yeast will usually quit working below 55° F, but lager yeast has the additional property of making extremely clean-tasting beer at refrigerator temperatures.

Did I Get an Accurate Starting Gravity Reading?

If you boiled part of the wort then added cold water to the brewpot or fermenter to bring your batch up to volume, you may not have gotten an accurate reading of starting gravity. Water is less dense than wort, so the water stays near the top of the vessel. Since a hydrometer floats, this situation will cause a false reading of a low starting gravity every time.

To get an accurate reading, stir the water vigorously into the cooled wort. If you ferment in a carboy rather than a bucket, put the airlock on the carboy after you've added the water. Then rock the vessel back and forth for at least a minute to mix the liquids together.

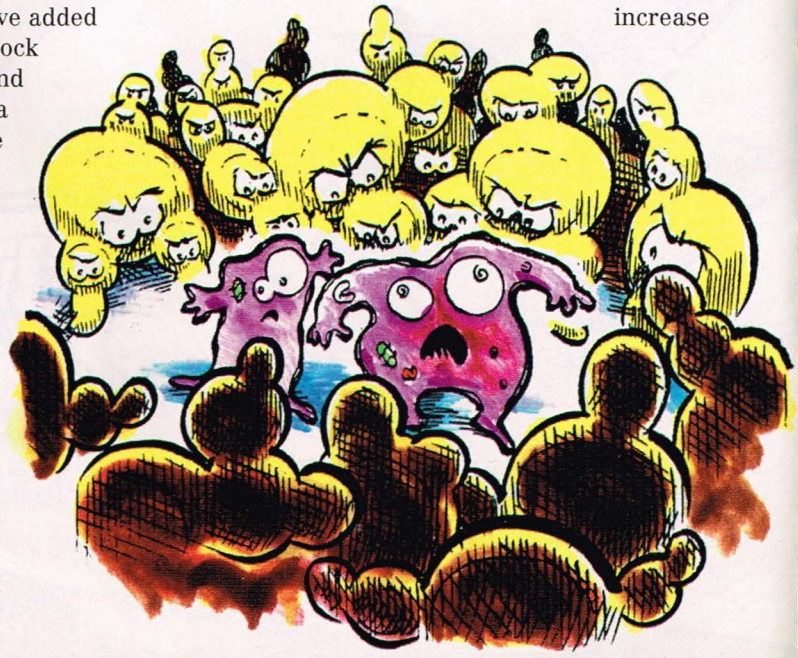
How Much Yeast Should I Pitch?

The proper answer to this question is "more." Homebrewers underpitch their yeast. We do it because of published recipes and, perhaps, for economy. If homebrewers pitched their yeast at the same rate as commercial breweries, we would be using about a pint of yeast in five gallons of wort! That would virtually eliminate the lag time before active fermentation starts and would greatly reduce the risk of contamination.

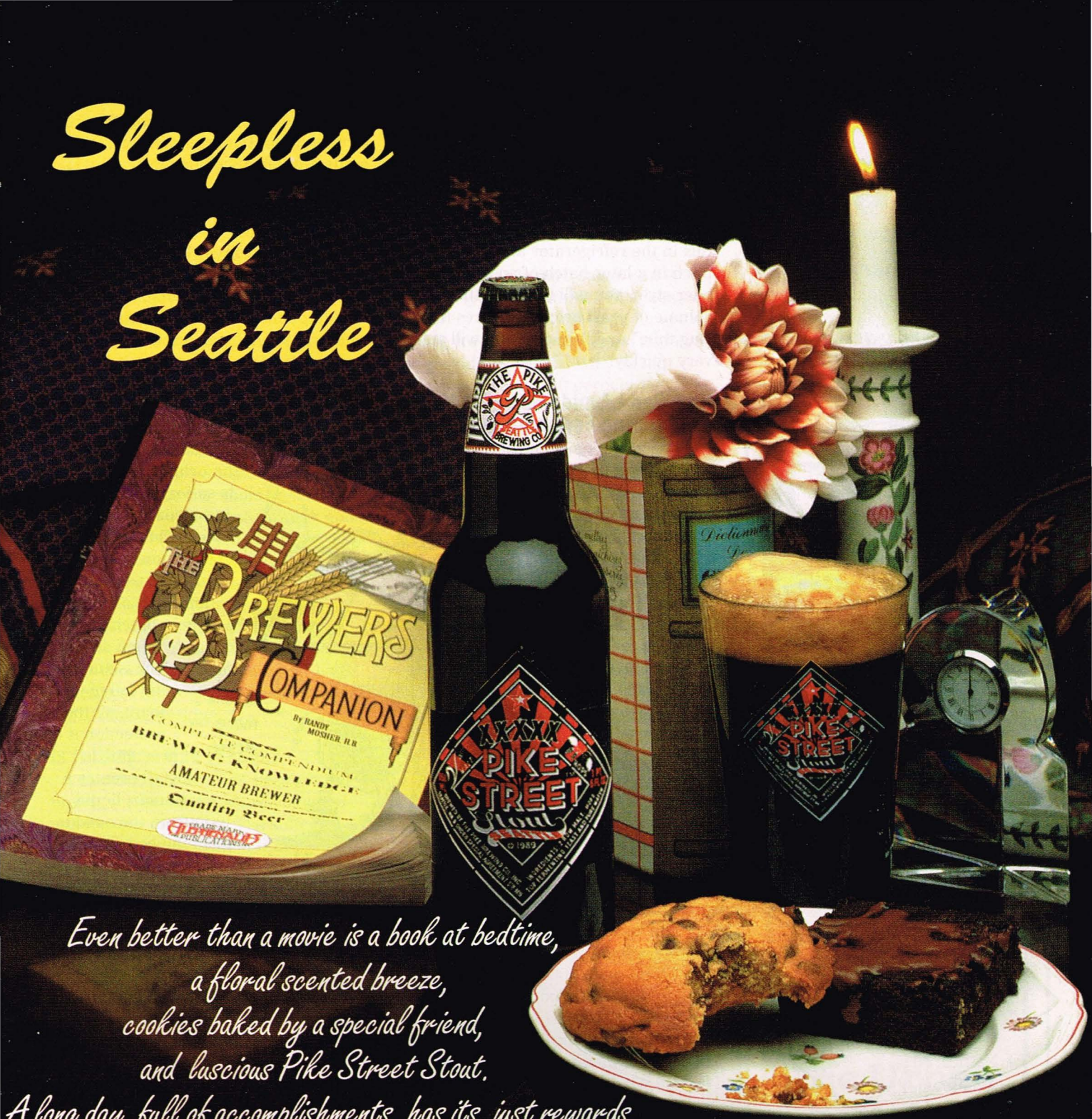
Theoretically, if sanitation were perfect, one live yeast cell would be enough to pitch. Eventually that one cell would produce enough yeast to turn all of your wort into beer. However, it takes millions of yeast cells per cubic centimeter to create visible signs of fermentation. If you started from one cell, it would be a long time before enough yeast cells existed to create a vigorous fermentation.

Unfortunately, sanitation is never perfect, so some bacteria and wild yeasts are always present. During the lag time before your good yeast cells multiply enough to really get fermentation rolling, the bad organisms are also reproducing as quickly as possible. If too little yeast is pitched, the lag time may be long enough to let bacteria and wild yeasts form substantial populations. When this happens, their by-products rise above the flavor threshold and are detectable in the finished beer. In short, the beer at best develops off-flavors and at worst is completely spoiled.

Pitch as much yeast as you can (within reason). When using liquid yeast, make a starter in advance to increase



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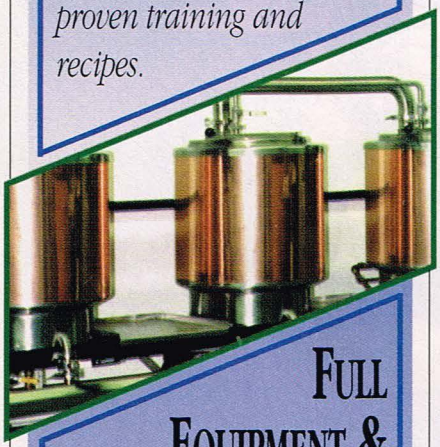
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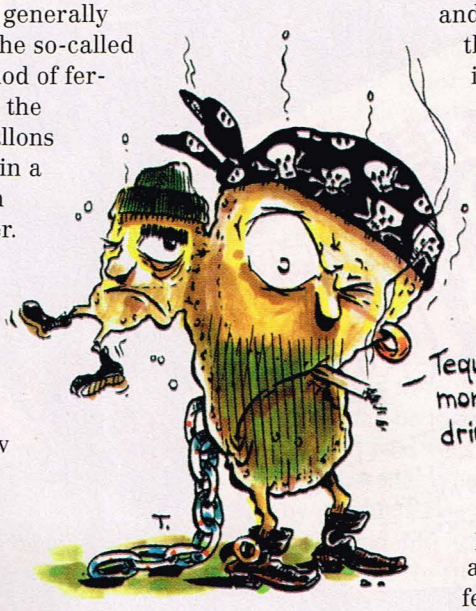
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the amount of yeast before you pitch it. There are a lot more cells in a pack of dry yeast than in liquid yeast, but the liquid yeast is a pure laboratory culture. Ideally, save the dregs from the bottom of a primary fermenter in a sanitized bottle with an airlock. Keep this in the refrigerator and use it to pitch in a later batch of an appropriate beer style. You will find that the larger volume of yeast greatly reduces the "lag time" and fermentation will start very quickly!

How Can I Avoid Losing So Much Beer During Fermentation?

This question generally arises if you use the so-called "blow-over" method of fermentation. That's the one where five gallons of beer is started in a closed, five-gallon primary fermenter. There is little room for foam during active fermentation, so a blow-over tube is used to allow foam to flow into another container and be discarded. You may lose as much as a half-gallon using this method.



The idea here is that there are harshly bitter hop resins and cold-break trub in the foam, and the finished beer will be better if these are removed. However, the liquid walls of those foam bubbles are beer, and it's wasted when it's allowed to pump overboard.

One solution is to use open fermentation. If you're making a five-gallon batch, use a six-gallon food-grade plastic bucket as your primary fermenter. Place the lid loosely over the bucket (but don't seal it). The foam will rise, then decline. A lot of the beer gets a chance to settle back into the batch. When primary fermentation is completed, siphon the beer into a five-gallon carboy — leaving the condensed hop resin, yeast, and trub spooge (called *braun-hefe* in Germany) — and place an airlock on it for secondary fermentation. When you're done, you'll bottle a full five gallons.

Foam Is Coming Through the Airlock. Should I Be Worried?

This problem is related to the previous one, except it is usually caused by an unintentional blow-over. This happens often in the summer or when yeast has been pitched into wort that is too warm. Sometimes it just happens with a high-gravity beer, such as a porter or barleywine. A homebrewer comes home from work and finds that his beer in the primary fermenter is so foamy it is coming through the airlock. This is a bad situation because it often causes contamination of the whole batch.

When an airlock is standing full of foam, all the protection it is providing is lost. It creates a continuous liquid path from the outside air to the beer in the fermenter. Bacteria will start to grow in the foam at the top and will reproduce right down into the beer.

To avoid this be sure to use a primary fermenter that allows at least one gallon for foam. If foam starts to reach the airlock, move the fermenter to a cooler location — even into a refrigerator temporarily if that is necessary to control the foam. Use vodka in the airlock instead of water, as this will help prevent bacteria from moving downward into the beer.

If you can't control the foam any other way, install a blow-over tube temporarily from the airlock hole of the fermenter into a container of sanitizer solution sitting next to the fermenter. This should be removed and the airlock replaced as soon as is practical.

Will Tap Water Contaminate Sanitized Equipment?

A lot more beer has been ruined by leaving a residue of sanitizer on equipment than by bacteria introduced when rinsing with tap water. Chlorine bleach is known to leave a residue on equipment. Even if you use iodophor instead of chlorine, you should give all equipment a good hot-water rinse after sanitizing.

Most drinking water is really very clean. Bacteria is present everywhere, of course, but the risks of a hot-water rinse are small. The truth is that all beer, including commercial beer, contains some bacteria. The important thing in brewing is to keep bacteria below the flavor threshold so it cannot be detected. This is done through good brewing practice, mostly by rapid and efficient wort chilling and by overwhelming a small amount of bacteria with a massive amount of yeast.

The risk of contaminating equipment through a good hot-water rinse is insignificant when compared with the benefits of removing any yeast-inhibiting chemical residue.

Is It Okay to Use Plastic?

Replace plastic often because in time it will become a source of contamination to your beer. The softer parts, such as the siphon tubing, should be replaced most often. Harder plastic parts such as fermenter buckets and racking tubes may last for years, but watch them and replace them if there is any indication of bacteria problems with your beer.

Unlike glass or metal, plastic is porous. When plastic parts touch beer wort, some of the beer will soak into the crevices. Sanitizing is more difficult with plastic, and such parts may eventually harbor pockets of bacteria that will contaminate any beer wort they touch.

Smell is the best indicator of this problem. Check your used plastic homebrewing equipment before you use it for a new batch. If there is an odor of beer, especially if there is an odor of soured beer, replace it. Lactobacillus (a bacteria that sours beer by producing lactic acid) is not your friend, and siphon tubing is cheap to replace!

Can I Substitute Dry Malt Extract for Corn Sugar When Priming?

Corn sugar and dry malt extract (DME) are not interchangeable when bottle conditioning. Although they both can be used to carbonate homebrew, the two ingredients are quite different.

Corn sugar is pure sugar and is 100 percent fermentable. This means that every bit that is used for conditioning is converted to alcohol and carbon dioxide by yeast. DME, on the other hand, is only 80 percent fermentable, at best. More DME (1.25 to 1.43 times more!) must be used compared to corn sugar to get the same carbonation level.

In addition DME contains protein that can cause haze in the beer if the priming mixture is not boiled, cooled, and clarified.

If you want to use DME, mix it with water (about two cups of water per cup of DME), boil the mixture for 15 minutes, cool it, and allow the hot and cold trub to settle. Decant off the clarified wort, and use it to prime your beer.

How Long Does Beer Have to Age in the Bottle Before Drinking?

Bottle-primed beer takes only about a week to carbonate. But carbonation is only one reason to bottle condition your beer.

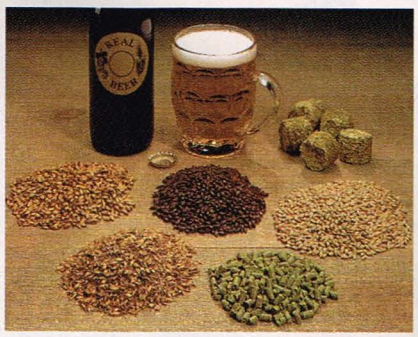
Another reason is clarification. If your beer is cloudy, let it sit undisturbed for a few weeks.

Beer flavor often improves with aging, too. A little extra time in the bottle will help get rid of young or "green" flavors — the ones that smell like apples or butter. These flavors will mellow as long as there is yeast in the bottle.

Strong beers, such as barleywines and Scottish ales, will mellow considerably with aging. The aging process for these beers can continue for months and sometimes years.

In general, if your beer is of ordinary strength, taste it after seven to 10 days to see if its ready. If you are brewing a strong beer, hold out for at least three weeks. And don't be shy about extending the aging time. Your beer will probably benefit.

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Grow Your Own Hops

By Scott Russell

Not only can you brew your own beer at home, but you can also grow some (if not all!) the ingredients for your homebrew. The easiest and most obvious choice is hops. You don't need a huge tract of land to grow hops, although to grow enough to brew year-round you'll probably find that you will be planting a large crop.

Commercial hop growers, whether in England, Germany, the Czech Republic, Washington state, Oregon, or even Vermont, cultivate from a few dozen to thousands of acres. But the homebrewer/homegrower really needs only a half-barrel of soil on the porch to grow a single vine or a few square feet of appropriate garden space for a more substantial planting.

Hop plants thrive on moist, rich soil with a pH around seven (between five and eight should be okay). They should be kept well watered during the entire growing season but never left to sit in swampy conditions. Therefore, the best site would be a patch in full sun that is accessible to a convenient

Mid-February	Weeks 1-6	Weeks 1-2
Planting: Prepare the soil and plant in mid-February to mid-April. Also divide well-established old hops and replant cuttings.	**Early Growth:** Water well! During the first four to six weeks, the hop plants need plenty of water.	**First Shoots:** If there is no more frost, the first shoots could appear in two weeks or less. Select the strongest 3 or 4 and cut back the rest (eat as an asparagus substitute).

RICK HUDSON ILLUSTRATION

water source and drains well. The vines can grow straight up as high as 20 to 30 feet, so there should be no obstructions overhead. One possible planting area would be a slope with southern exposure where the soil is improved with wood ash, manure, or compost.

Selecting a Variety

The variety of hops you choose to grow depends, of course, on what you like to brew and how much. Some varieties do better in certain locations. Some are prolific vine producers but minimalists when it comes to cone harvest.

In New England, where there is a short growing season (sometimes only 50 days), people have had success with almost every available variety, but especially with those that are normally fast-growing and productive such as Cascade, Nugget, Chinook, and Willamette.

If you live in the Pacific Northwest, you're in luck. A huge percentage of commercial hops are grown in the Yakima and Willamette valleys. There probably isn't a variety that won't grow successfully somewhere in Washington, Oregon, and Northern California.

If you live in Minnesota, Kansas, Louisiana, Florida, or Arizona, don't despair. There is historical record of hops being grown at one time or another in every state in the union and in almost every country in the world where people have made beer. If you prepare the soil, research the site carefully, and remember to water your plants properly during the first year of growth, you can overcome almost any climate.

Finding Rhizomes

To start a hop garden you need female hop rhizomes, the bud-producing runners from which the plants grow. Until recently they were hard to come by. You either had to know someone who had them or cut a deal with a commercial grower to acquire them. Oh, some garden and nursery supply places might sell you an ornamental vine, but you never knew what variety it would turn out to be or even if it was usable for brewing.

In some places such as New England, lucky homebrewers found old-growth hops (often gone feral) around abandoned house sites, in old barnyards, and in similar forgotten areas.

Now, however, there are large-scale suppliers who deal in both commercial and retail sales of rhizomes. In addition, most retail brewing supply places (both stores and mail-order) place an order for their customers in the spring. Check with your regular supplier in February to see if they have plans to get some (and if they don't, encourage them to do so!).

Wherever you get rhizomes, be sure they are female. Only female hop plants produce cones and if male plants are lurking about, the cones become seeded. Most brewers prefer seedless hops.

Preparing the Hopyard

It's never too early to prepare the soil where you plan to plant hops. It helps to give it an entire winter to set-

A Word about Yield

Just how much will you be able to harvest from your hop vines? For almost all varieties, don't expect much of anything the first year. If you get a good, vigorous growth, you have won the battle. If you also get a handful or more of cones in the late summer, that's gravy.

Starting with the second year, however, you can expect more productive output. Vigorous varieties may produce three or four pounds of fresh hop flowers in a season on each plant (which, of course, will dry out to only a few ounces). It's not unheard of for some notably productive varieties (Cascade and Chinook, for example) to give as much as six pounds if the conditions are particularly favorable.

On the other end of the spectrum, varieties such as Saaz and Willamette usually only produce 18 or 20 ounces of fresh cones in a good year. The better you mulch them and the more faithfully you weed around them, the better the growth of the vines, but this does not necessarily guarantee an increase in flowers. Rather, the more hours of sunshine during the latter part of the growing season, the more cones you will probably get. And that, alas, is beyond our control.

Weeks 8-12 (late May)

Rapid Growth:

No matter how long ago they were planted, hop plants usually begin to grow rapidly in late May because day length influences hop growth. Put in stakes,trellis, supports, etc. As vines grow train clockwise (or counter-clockwise in the Southern Hemisphere!) around support twine.

Week 16 (early July)

First Flowers:

Flowers will usually appear just after the summer solstice or around the first of July (depending on how warm and how wet the summer has been to that point). At first just little buds that don't look like much, they will grow fat and green and get heavier over the next few weeks.

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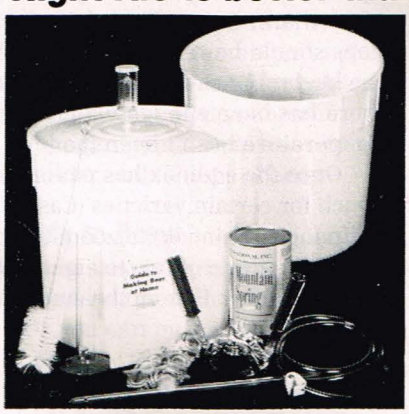
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"I've had microbrews from all over the eastern U.S. and your *Noah's Good Night Ale* is better than all of them. Send me two more Bru-Paks." *T.B., Ohio*



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I've paid up to $4.00 a bottle throughout the U.S. for popular microbrews. One in particular was a dark ale from Rhode Island which I thought was quite good. To create a similar beer I went back to the Bierhaus brewing kitchen, and our brewing technician Dave and I started brewing. After several batches and much testing, we created a dark ale that is SUPERB. Far superior to any dark ale I ever tasted. The concept we used was truly a step up in home brewing and led to the development of the **Bierhaus Next Step Bru-Paks.**©

This new Bru-Pak© greatly simplifies making world class beer. These are not the usual kit beers made with sugar, but malt and grain beers exclusively crafted and tested, with flavor and body you won't believe. You get your choice of ***Pilsen Supreme***, a smooth golden color beer with a crisp, clean taste and pinpoint carbonation, ***Noah's Good Night Ale***, a dark, rich Euro-style beer with a smooth, creamy head and just the right body, and introducing ***Summer Sunset Raspberry Wheat***, a most pleasant looking and tasting beer. Its rich ruby color compliments the dry light body and fruity character. Usually popular in summer, this beer will be a favorite all year long.

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tle and energize, but a couple weeks before planting will still do the trick. One method that has yielded good results with nine different varieties, even in the frosty climes and short growing season of central Vermont, is as follows:

1. With a post-hole digger or small spade, dig three circular holes, about eight inches in diameter and 10 to 12 inches deep, arranged in a triangle with at least a foot of space between each hole (the vines may intertwine at this distance; if you can, grow them farther apart).

2. In the bottom of the holes, place a one-inch layer of wood ash, an inch of straw or grass clippings, an inch of some mellow, already composted manure (sheep seems to be about the best), and three inches of the topsoil you removed from the hole, and cover with three inches of mulch.

3. Water well. Let age and settle for at least two weeks.

4. After vines begin to grow (see below) you will need to rig up some kind of trellis system for them to attach to. It sounds absurd until you have actually grown them, but a hop vine may need as much as 30 feet of vertical support for a single year's growth! Most hopyards train the vines on 18- to 20-foot trellises. So before planting, put in one stake (a foot tall, more or less) in the center of the triangle. Behind the triangle, perhaps three feet away, install a pole with a long strand of strong twine attached to the top, long enough to attach to the stake at the bottom when it becomes necessary in a few weeks.

Time to Plant

Here is a simple rule of thumb for planting: Earlier is better than later, as hops are hardy enough to weather a frost or two.

Plant new hops about the same time you plant your early peas. In the northern climate zones this is usually late March or early April. Farther south and in the temperate Northwest, where it rarely if ever frosts, hop growers don't consider mid-February too early. You need to have workable ground, unfrozen and moist but not swampy. In very warm and in particularly arid areas, irrigation will determine success, but planting times shouldn't be any earlier than late winter.

The pole can be anything that does the job. One possibility is a 15- to 30-foot maple sapling, one inch to 1 1/2 inches in diameter, stripped of all branches and leaves.

Planting Rhizomes

Hops are a fairly hardy plant, all in all, so it's hard to get them in the ground too early. However, if you live anywhere where there is frost or snow, you'd best wait until the ground is workable. It's hard to dig these holes if the soil is frozen solid. If you're a gardener, a general rule of thumb is to plant new hops at the same time you put in your peas.

Once you have established hop plants, you can use them to judge when to plant new ones. When the old ones begin to look as if they are sprouting, it's time to put in the new ones.

The rhizomes should be stored in the refrigerator until you are ready to plant them. When planting time comes, soak them in luke-warm water as you transport them to the hopyard. Dig out the layer of mulch and an inch of the topsoil you put into the holes. Lay the rhizomes on their side, one to each hole. Be careful not to damage rootlets (if your rhizome has them) or eyelets that are present on the rhizome.

Try to spread out the rootlets and eyelets on the (horizontal) level of the rhizome itself. Cover with topsoil to a depth of one to two inches, then cover with loose mulch, leaving at least two inches of hole above unfilled. Water well. Continue watering daily for a week, then frequently enough during the first growing season for the soil to never get dry but not so it remains swampy.

The Growing Season

Some varieties of hops will be up and growing within a few days of planting. Others may take four weeks and then, just as you are ready to give up on them, 12 shoots will come up out of nowhere. Generally speaking, your hops should be several inches high by the beginning of summer, provided there has been enough water and the temperature hasn't been too low.

Once the equinox has passed, watch for certain varieties (Cascade, Tettnanger, Chinook) to zoom up the strings at a rate of two to eight inches a day. Yes, a day. Late in the summer,

Week 19 (late July)

Harvest:

Early varieties (like most of the Hallertauer derivatives) are picked starting in late July. Regional variations are more prevalent here than in any other aspect of hop growing. Somewhere in the US there are hops being picked from Bastille Day to Columbus Day or later. Commercial growers tend to pick all of one variety at once. The homegrower can pick a little at a time as they become ripe, which makes drying and storing less of a logistical nightmare.

November 15 or so

The First Frost:

After the first frost, cut vines back to an inch or two, mulch, and put to bed for the winter.

growth will slow way down and the first flowers will begin to appear, then fill out and mature (although many varieties do not flower at all during their first growing season).

Harvest Time

Perhaps the trickiest part of growing your own hops is knowing precisely when to pick. Varieties will vary, of course, but a general rule of thumb is to check the cones daily:

- By sight. They should look uniformly light green to yellow, paper-thin, beginning to separate a bit, with a trace of yellow dust (lupulin) on the stem end of the cone.
- By touch. They should feel papery, dry, not quite brittle.
- By smell. After squeezing one of the cones, your hands should smell like hops. However, you shouldn't be able to smell the resins from more than a few inches away from the plant.

If they seem ready to pick, go ahead and pick 'em! Gather a few friends and break out a few homebrews on a clear warm day, cut the vines down at about the 15-inch line, lay them on a clean, dry surface, and remove all the cones one by one. (It can be a long, tedious job, which is why you need the friends and the homebrew.) Warning: Do not try to pick hops from a standing vine if homebrew is going to flow. It is always safer to work on the horizontal than to be on a 10-foot ladder with a mug of beer.

Get Ready to Brew

The next step is to dry the hops. You can be fancy and do it in a dehydrator. Or you can put them on a cookie sheet and dry them in an oven (with the door open) at 100° to 150° F. Or you can air dry them.

To air dry you need a space that is breeze-free, dry, warmish, and vermin-free. Set up a series of window screens or mesh of some kind so that they are horizontal but don't lay on the floor. Place your harvest bounty on the screens, then just leave it. It will take a few days to dry, but it's cheaper than a dehydrator or the electricity to keep an oven running for 10 to 12 hours.

When the hops are dry, you'll know. They should feel very brittle but still be green, and they should weigh a fraction of what they did when you picked them (so don't get excited over the pound of Cascade flowers you got from the first year's growth — when all is said and done, all you've got is an ounce!). Pack the hops into zippered plastic storage bags, squeezing out every bit of air that you can, label them, and place them in the freezer.

Voilà. Fresh hops to bitter, flavor, or aromatize your homebrew!

Recycling

By the way, you don't have to throw away the vines you cut down. Before they dry out they can be woven into very attractive and sturdy wreaths or baskets. If you don't weave and don't know anyone who does, the vines can either be composted to use as mulch for the next planting or dried and burned to create suitable ash to sweeten the holes for the next batch of rhizomes.

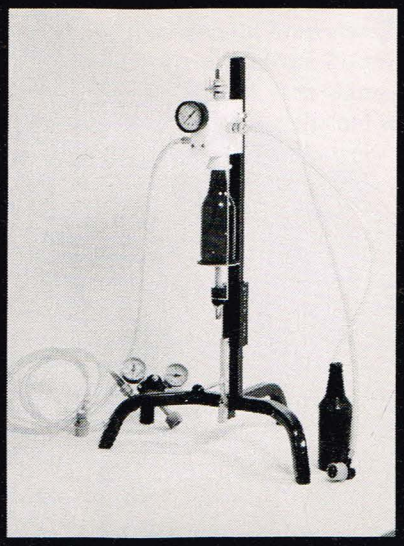
Last word: After the harvest let the vines grow if they will, but as soon as the first frost comes (or by November if you live in a frost-free region), cut them to an inch, fertilize, and mulch for the winter.

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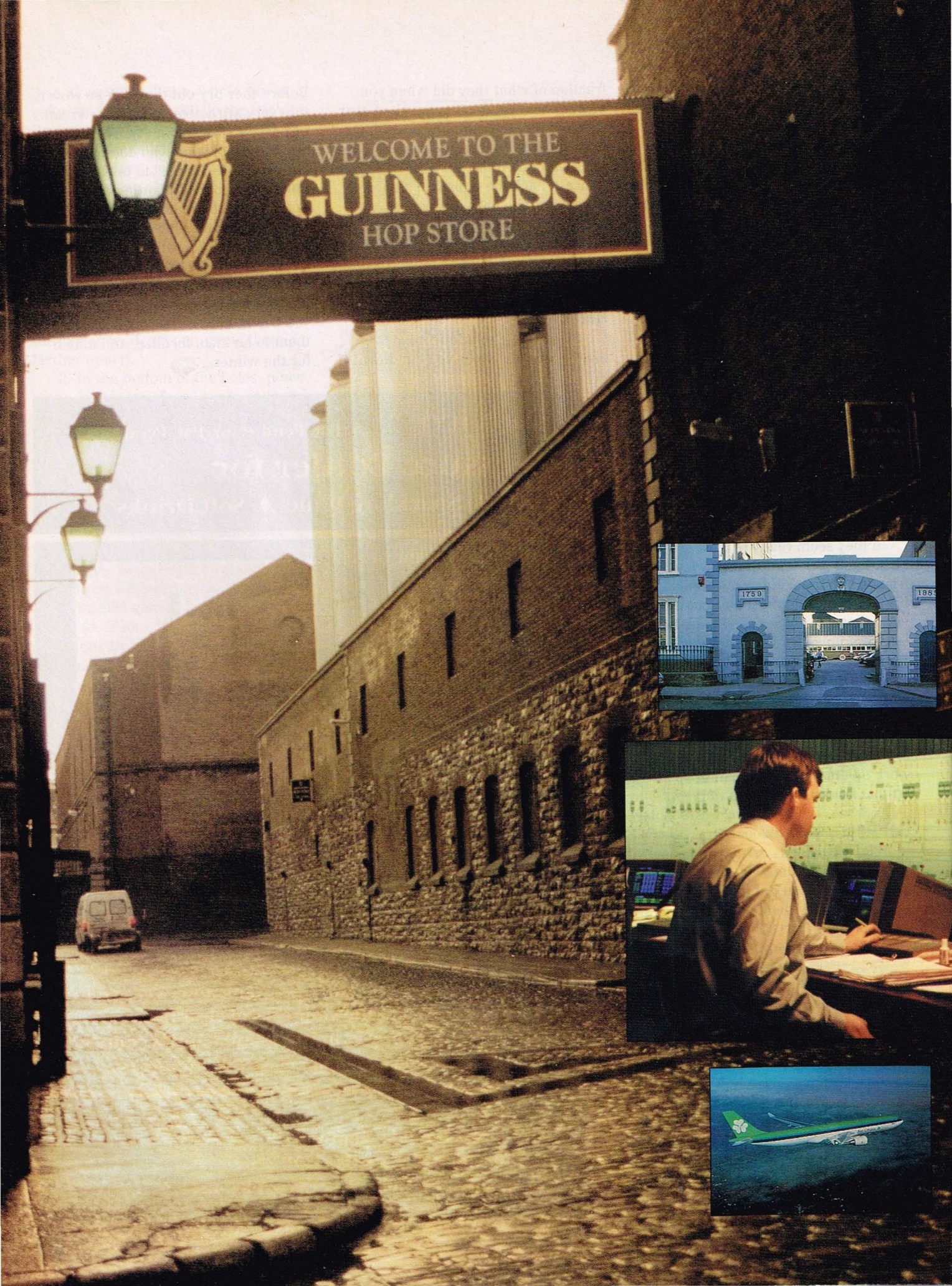
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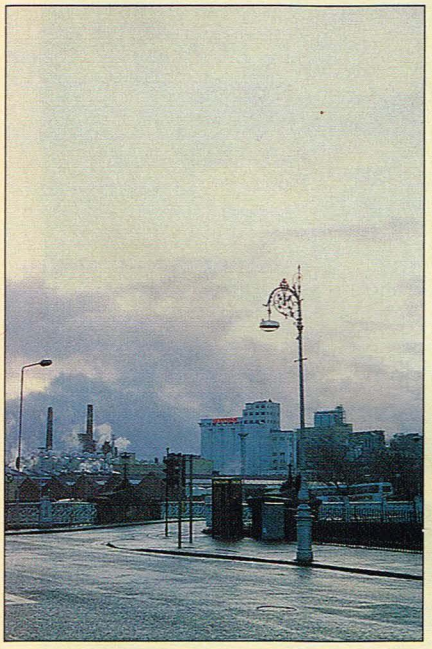

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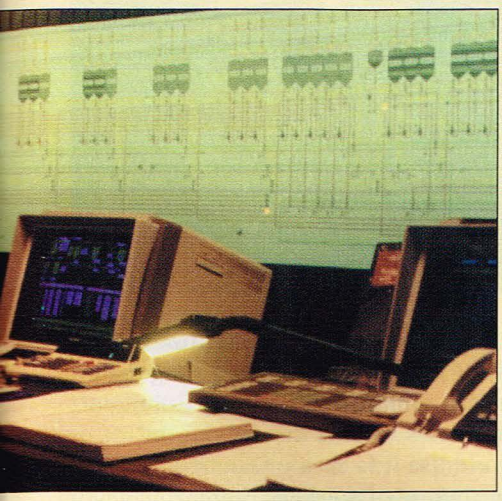


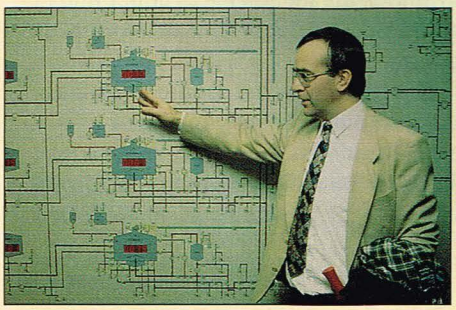
Stout-Hearted in Ireland

Take a Private Tour of the Guinness Brewery. Homebrewers Only!

By Sal Emma







The Guinness brewery in Dublin, Ireland, is a time machine. Cobblestone streets link the gray stone and red brick buildings — narrow thoroughfares where draft horses once clopped their way around the sprawling complex, hauling malt, hops, kegs, and men from job to job, batch to batch.

Today, diesel trucks and forklifts ply these time-worn paths of stone. Rubber tires roll over the iron tracks of the brewery's narrow-gauge steam railway system, built in the late 1700s to supplant horse-drawn transport.

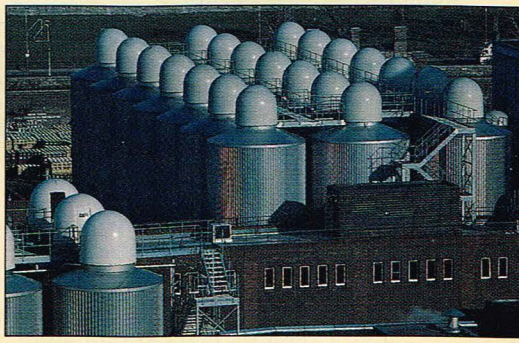
The brewery complex is a tapestry of old and new. Guinness brewers oversee 21st century computer-automated brewing in the shadow of Arthur Guinness' original brewery and residence, for which he invested £100 (about $150 today) of inherited funds in 1759.

Guinness made a real estate deal that would make any modern businessman jealous: a 9,000-year lease at £45 per year, with water rights included.

Of course, at the time £45 was nothing to sneeze at. And the property was nothing to brag about. Only four acres, it was small, already 90 years old and broken down. It had been sitting idle for nearly 10 years when Guinness made his deal for one of dozens of nondescript breweries in Dublin's industrial quarter, known as the Liberties. Located at St. James Gate, one of the gates in the old wall surrounding Dublin, the brewery Guinness bought consisted of a copper, a mash/lauter tun, two malt houses, a mill, stables for 12 horses, and a loft that could hold 200 tons of hay.

Guinness was an ale man. Ale was the true King of Beers in those days, and Guinness went about producing ale for Dublin. Later, a newfangled style caught his attention: porter from England.

Porter, it is said, was invented by accident. According to one theory,



Guinness old and new. Opposite: Fermenting tanks loom over cobblestone streets. Inset, from top left: St James Gate; the old flaking plant from a distance; a computer system tracks the flow of every ounce of beer at the brewery.



Porter was born when London brewer Samuel Harwood left his malt in the kiln to dry a bit too long. The grain was roasted dark, almost black. Not wanting to let it go to waste, the thrifty Harwood brewed his beer with it anyway. The resulting beer was very dark, almost black, with a roasty flavor and aroma that made Harwood want to throw the whole thing away. Then a curious thing happened: The beer became immensely popular with the porters working London's theater district.

Harwood and other London brewers continued making it and eventually exported it to nearby Ireland. The trend grew there, and Guinness tried his hand at the newly imported style.

Porter's popularity expanded in Ireland, and Guinness eventually was faced with what would become a historic decision. Making both ale and porter was not economical — he had to decide on which to spend all his efforts. He chose the latter. In 1799, late in the pioneer brewer's life, he made a diary entry: "Today I brewed my last batch of ale." Four years later Arthur Guinness died at the age of 78, after sowing the seeds of one of the world's most successful brewing firms and one of the world's most distinctive beers.

Before he died, Guinness tinkered with the porter style and came up with what the world now calls stout. He made it stronger, darker, and richer, a porter called "Extra Stout" to differentiate it from competitors.

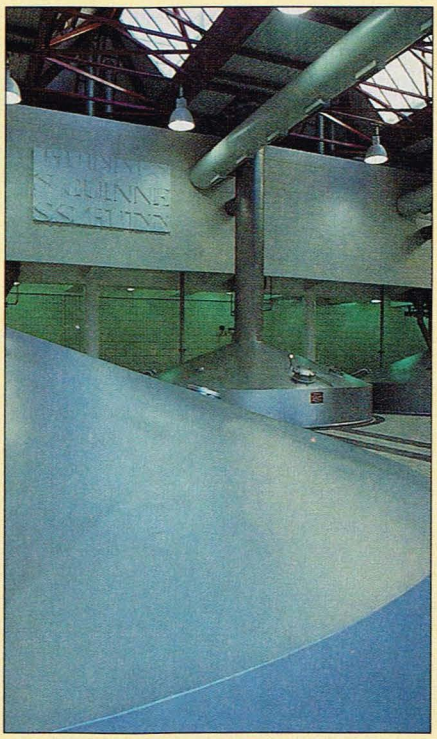
The rest, as they say, is history. As Ireland's transportation network expanded, so did the stout market. The black beer of Dublin made its way to a thirsty public, floating on barges plying the River Liffey and later the country's canal network. The beer's reputation spread and Guinness became a hot commodity for merchants around the world.

Today, Guinness makes stout, ale, and lager in breweries around the world. But the Dublin brewery is still devoted to the original, flagship brand, Guinness Stout. The Dublin brewery produces four million pints every day: figuratively enough for every man, woman, and child in Ireland to have a pint a day. Roughly 40 percent of the brewery's output is bulk-shipped to canning and bottling facilities. Sixty percent goes to the keg lines. Of the beer that is kegged, 45 percent goes abroad. In fact all the kegged Guinness Draft consumed worldwide is produced at the 65-acre Dublin plant.

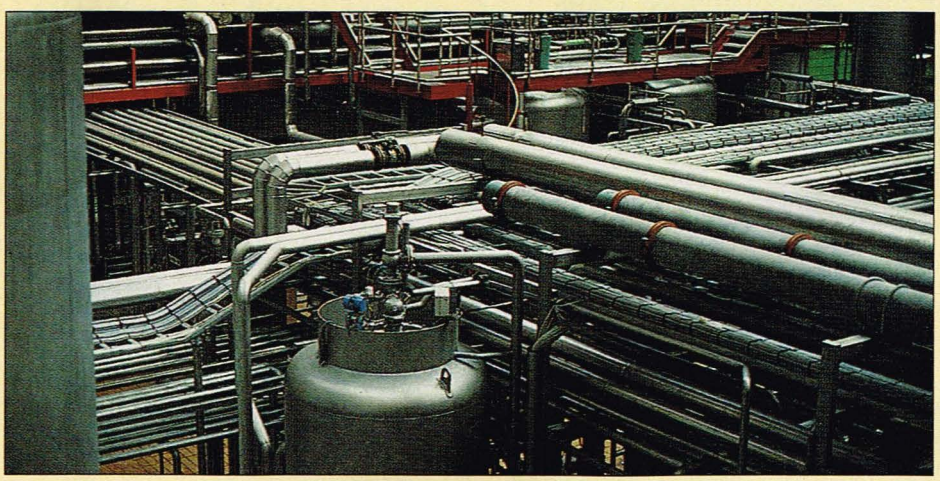
Another product of the Dublin facility is the mysterious Guinness flavor extract. Mysterious because no one inside the organization is willing to say exactly what it is. The many Guinness breweries located throughout the world use it to create Guinness Stout for their own markets, employing local raw materials for a base product and blending in the flavor extract to complete the job.

The flavor-extract method ensures quality and consistency in all the world's Guinness, no matter where it is brewed, be it Africa, Asia, the Caribbean, or any other of 40-some

Clockwise from right: The brewhouse; the kegging plant; preparing the latest batches for the final evaluation — the taste test.













Above: Fermentation tanks top the Fermentation and Blending Plant (FBP). Left: The upperbacks, which look like coppers, are used to store wort when no boilers are available.

breweries that produce Guinness in some form or another worldwide. Dublin lies at the heart of all the world's Guinness.

Americans, however, do not have to concern themselves with the flavor-extract method. The Guinness Draft that your favorite American pub is pouring is exactly the same as the stuff they pour in Dublin. One of the myths surrounding Guinness is that it's better in Dublin than in the US. Not so. Guinness has pioneered the use of nitrogen as a draft gas and its specially designed keg-handling and tapping system is the same in both Ireland and the States.

Dublin's City within a City

Presiding over the Dublin operation is Matt Murphy, a slender, tall man. Murphy is pleased about America's beer renaissance. "With the microbrew phenomenon, opportunities for craft-made and unique beers like Guinness abound," he says.

The operation Murphy oversees is impressive. Six hundred people work at the Dublin brewery. Four hundred are employed directly in brewing operations. They use 40,000 metric tons of Irish barley each year. In fact some Irish farmers grow nothing else and sell to no other company.

Malting

Guinness malts its own barley but no longer at the Dublin site, where a traditional floor-malting was employed until recently. Now, the grain is malted throughout the Irish republic before arriving in Dublin by truck. A portion of the grist for Guinness is raw and a portion is roast, made from barley roasted on site at Dublin.

The roastery is impressive, steeped in a delicious roasted-coffee aroma emanating from the warm grains. The roastery operators oversee two enormous gas-fired drum roasters, each with a capacity of three metric tons. They roast some 13,000 tons each year — around 28.6 million pounds.

Each roaster has a sampling scoop built in, which the roast operator uses to draw out several handfuls of hot grain. He then dips in a special tool that sorts out several grains and stands them on end. A flip of a finger and a built-in blade neatly cuts each of the grains in two, so the roast operator can look inside to see the progress of color through the kernels. The lion's share of grain for the roasters is raw barley. But a percentage of malt also goes through the roastery.

"We sell a fair amount of Guinness Stout in Germany," explains Gerry McGovern, Dublin's production manager. "The Reinheitsgebot, Germany's beer-purity law, allows only malt to be added to beer. So to maintain German standards, we roast barley which has been malted," McGovern says. It could be argued that roasted barley is the ingredient that makes Guinness what it is. It certainly is what contributes to its nearly black color and hearty, roasty flavor and aroma.

Head Case

But the amazing, almost extraterrestrial creamy white head is perhaps



Guinness' most dramatic trademark. Dense, thick and everlasting; for Guinness fans, drinking a properly pulled pint is a religious experience. Watching and waiting for the perfect head to rise in a gentle dome above the rim of the glass, then nursing it down to the last swallow.

Engineering that incredible head involves a variety of important ingredients and techniques. It starts with raw, unmalted barley in the mash. Raw barley is revered by brewers for its ability to increase head formation and retention.

But until recently, raw barley was tough to deal with. It is one of nature's hardest, most stubborn cereals, difficult to grind by standard methods. The average grain mill cannot handle it, so it traditionally was flaked by a separate process before being added to the grist for Guinness.

Flaking involves passing the tough little barleycorn through huge industrial rollers, which exert enormous pressure. The product is small flakes of barley, somewhat resembling oatmeal. In fact the building that dominates the Dublin complex is the tall, white concrete flaking plant, emblazoned with the word "GUINNESS" in huge, red neon letters. Until recently, all the raw barley added to Guinness was flaked there. But modernization has seen the flaking plant become obsolete and it is no longer in use.

"Flaking was made extinct by modern milling technology. The new mills are so good that flaking is no longer a prerequisite to mashing," McGovern explains. The raw barley goes straight into the new mills, and they handle it just fine.

Mashing

McGovern notes that unlike those in corn and rice, the starches in raw barley do not have to be gelatinized before mashing. So no cooking is required. The enzymatic action of pale malt is strong enough to convert the starch into the sugars required for fermentation. So you won't find any cereal cookers at the Guinness plant.

Guinness' new brew house is laid out in the traditional, top to bottom design. Though the grains are not milled on the top floor, they are sent there by conveyor for storage in the huge grist bins. To mash a batch of Guinness, you'll need 22 tons of grist (48,501 lb.) of around 65 percent pale malt, 25 percent raw barley, and 10 percent roast. Add that to 50 tons of water (13,233 gallons) in the mash tun, where huge, automatic paddles and knives rotate through the mash to keep it loose and well-mixed.

The water comes from Ireland's Wicklow mountains. It's relatively soft, but with the right blend of minerals for a successful mash. It's the same water that Arthur Guinness used to make stout back in the 18th century.

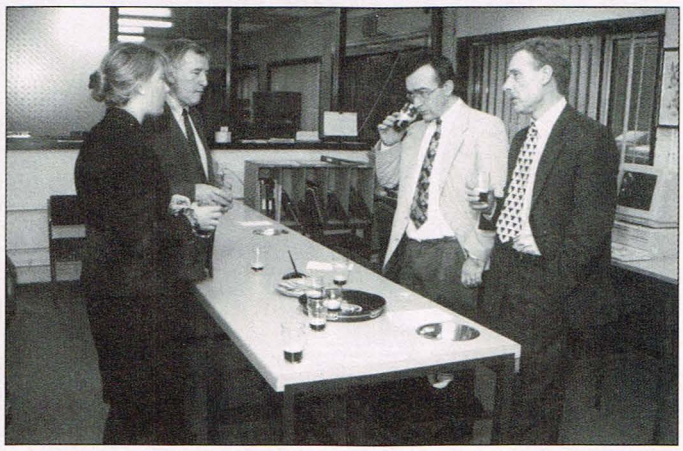
The mash rests at 65° C (149° F) for 75 minutes, then it is stepped up to 67° C (152.6° F) and held for 45 minutes, then mashed out at 78° C (172° F).

The mash is fully converted in just over two hours, but the whole process takes about three. After mash-out it is automatically transferred to the kieve (pronounced "keev").

"Kieve is a term unique to Ireland," McGovern says. "Most breweries call this vessel the lauter tun, where the mash is strained and rinsed over a false bottom to extract the sweet wort for fermentation." The word is derived from the French word for copper, *cuivre*, pronounced "kweev." McGovern says the Irish just like to be different.

The Boil

The sweet wort is piped to the next level down, the coppers. Fabricated of stainless steel, these boilers are copper only in name. The brewers boil off 10 percent, to a total of 1,200 hectoliters (about 1,000 barrels, or 31,000 gallons). The brewhouse has three coppers and three upperbacks, vessels used for temporary storage of sweet wort in the event no boilers are available. Coppers and upperbacks are essentially of the same design. However, the upperbacks do not have boiling equipment attached.



You don't have to be a world-class brewer or a Guinness executive to join the final taste test in the sample room. People from all walks of life drink Guinness, so all types of people help taste each batch before it's released.

Guinness boilers employ the external boil "Calandria" method, where heat is transferred to wort by a bundle of steam pipes in one small area, where the wort is heated to boiling, then pumped in circulation through the kettle. The heat is not actually applied to the kettle. Because they are so huge, it would be challenging and inefficient to heat the kettles directly. McGovern likes the Calandria system because it is fast and furious. "Our boilers get the wort going quickly and keep it at a very vigorous, rolling boil, which is key to making good beer."

Guinness Stout is hopped only once, in the kettle, with a blend of hops. About 100 kg (220 pounds) of hop pellets are added at the start of the 90-minute boil. Depending on season and availability, Guinness may contain Nugget or Galena from the Yakima Valley, Northern Brewer from Germany, Pride of Ringwood from Tasmania, Kent Goldings from England, and other varieties from other regions.

Fermentation

After boiling the hops are strained out, the wort cooled, and more than



500 pounds of yeast is pitched as the wort makes its way to one of the brewery's several dozen outdoor stainless cylindro-conical fermenters. Fermentation is warm and fast: 48 hours at 25° C, or 77° F, using a strain of yeast descended directly from that used by Arthur Guinness.

The fermenters tower like silver sentinels, standing in groups around the brewery complex. They come in several sizes, the largest big enough for one 2,300-hectoliter (1960-barrel) batch. After primary, the beer goes to centrifuge for yeast removal, and isinglass finings are added for clarification. Then it goes to another waiting cylindro-conical for secondary fermentation, which the Guinness brewers refer to as "maturation."

The secondary ferment is important to the final product. Guinness Stout is kraeusened in the secondary. That is, blended with gyle (unfermented wort) and a little yeast to set up natural carbonation. No Guinness is artificially carbonated. Nor is it filtered. When you get right down to it, Guinness is made a lot like homebrew, only on a mammoth scale.

The maturation and conditioning period lasts 10 days. From there the beer is carefully blended with previous batches until the brewers are satisfied that the proper flavor balance has been reached. Only then is the product released to the keg lines or to bulk transport.

The Old and the New

Until 1988 all the transfer of wort and beer was completed manually by men turning huge hand-crank valves in the Dublin facility's "storehouse," built in the 1870s and fitted with cavernous square aluminum fermenters in the 1950s.

The storehouse is still there but only collects dust these days. The building is red brick on the outside, iron, tile, and concrete on the inside. Overhead runs a maze of pipes, tubes, chains, and pulleys. Narrow corridors wind their way between the fermenters and pump stations, where hundreds of men once trotted from pump to pump, valve to valve, getting the beer from one vessel to another.

The tools of their trade are still there, custom made for the big square fermenters and now useless. Dipsticks, paddles, and other gadgets, they hang, seemingly at the ready, inside large rusting steam chests.

Production manager McGovern himself spent the first half of his Guinness tenure in the old storehouse, before modernization made it obsolete. "Before anything was dipped in the wort, it was sterilized by steam in the big chests," he explains.

Making beer this way was somewhat inefficient and very labor-intensive. Everything was done by hand with the manual valves and pumps. The fermenters were flat-bottomed. Once they were drained, men had to climb inside and shovel out the sediment. Then workers with hand-held steam guns sterilized the whole place, standing on the bottom.

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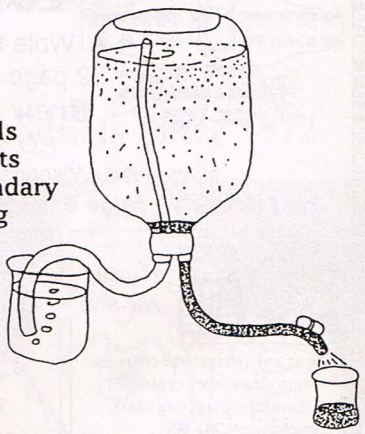
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The fermenting tanks are nothing short of mind boggling. The larger ones can each hold 26 double-decker buses. Today, they sit idle, dusty and dark, disturbed only by the occasional visitor. It's hard to resist sticking your head in the manway and yelling "Hello-o-o-o." The echo lasts a good 10 seconds.

McGovern opens a locker to uncover a grid of pegs, each labeled with a number. "The valve keys were stored here. Each valve was numbered, with a lock on it. Each key number corresponded to a valve. When we wanted to move some beer, first one man devised the plan. That was checked by another man and approved. Then the valve keys were distributed and the valves unlocked.

"Each valve was checked by another man and approved. Finally, when the manager gave word, the valves were opened and the pumps switched on to move the beer. Even with all the checking and cross-checking, we still lost a fair amount of beer. It was quite a challenge to keep track of it all."

The Refit

McGovern's valve story is a graphic example of what prodded the brewery managers to look at modernization in the 1970s. The brewery managers realized that the art of brewing had progressed beyond the Dublin plant's design. Clean-in-place stainless steel was the wave of the future and automation was on the horizon. A near total transformation in process was in order. To date the firm has invested some £200 million (about $300 million) in new technology and equipment.

When you get right down to it, Guinness is made a lot like homebrew, only on a mammoth scale.

The new brewhouse has capacity to brew 16 batches every day. On average four batches per day are produced, a total of more than four million pints.

The new FBP, Fermentation and Blending Plant, is an orderly, sparkling-clean web of stainless pipes, tile floors, valves, drains, tanks, and automatic pumps. The place hums loudly, and workers there wear earplugs to protect themselves from the din of machinery.

Under the FBP the bottoms of the outdoor cylindro-conical tanks pierce the ceiling at regular intervals. Each is surrounded by a nest of pipes, manifolds, and remote-control valves. Brightly lighted and with a white tile floor, the FBP is operated from afar by the brewers in the control room. Being there is like being inside a leviathan, living creature. Valves

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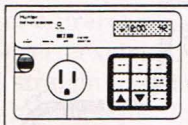
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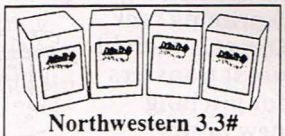
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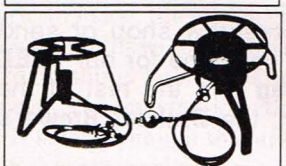


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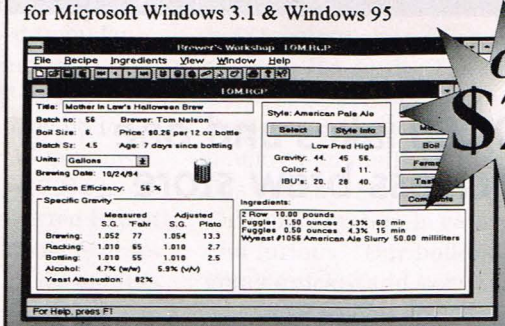
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open, vents are released, pumps switch on and off. It is an industrial symphony of clanging, whirring, hissing machinery performed in three-dimensional living sound.

The beer makes its presence known by its distinct aroma. But sometimes the product is less subtle. An occasional, short-lived river of dark, foaming stout rushes down a floor drain, the last remnants of a tank being emptied or overflow from cleaning. It's a strange and wonderful place.

Above, protected from the noise by a wall of glass, sits the modern brewer. Gone are the rubber boots and coveralls. Today's brewmasters sit in climate-controlled comfort, clad in jackets and ties, overseeing a dizzying array of computer terminals, protocol notebooks, and an amazing wall of blinking LED indicators and lights.

Two such control rooms are where the action is at today's Guinness plant. The smaller is where brewers oversee wort production and boiling in the brewhouse. The larger, more spectacular room is in the FBP. A curved schematic diagram stretches from one end of the room to another, adorned with flashing lights and LEDs. The entire brewery process, from mill to keg to cleaning, can be ascertained with one glance at this diagram.

Every valve, every tank, every vent is interfaced with the computers. Procedures are completed almost effortlessly, with little resemblance to the days of sweat and grime spent by brewers of yesterday.

Keeping It Perfect

The brewery's impressive array of advanced technology does not make beer by itself. The machines cannot monitor quality, either. That job requires a human touch.

If the beer made at the Dublin brewery has a pulse, Norman Kinsella is the man with his finger on it. As director of quality assurance, Kinsella knows the beer intimately. He pokes it, prods it, cooks it. He takes it apart and puts it back together again, all in the name of quality. You might say he is a little obsessed with quality.

"There's a certain mystique, a sort of folklore attached to this beer, especially at this brewery," Kinsella says, ever mindful of the palpable presence of Arthur Guinness' historical legacy in Dublin. "That goes a long way in terms of image, character, and interest in the marketplace. But it only goes so far. What really counts is the beer itself. We can't lose sight of the fact that every pint, can, and bottle has to be as good as it can be, and that takes effort," he explains.

You might say Kinsella is mad about Guinness, or at least head over heels for it. He's an animated, fast-talking, serious-looking guy who puts his heart into his work — and into talking about his beloved stout. He has an intense look in his ice-blue Irish eyes. He's serious about something most of the world takes with a grain of salt, the humble barley drink.

"We've got to be on top of the product long after it leaves the brewery, because the way it's stored, han-

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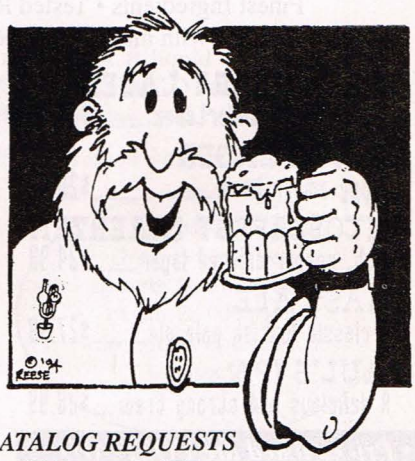
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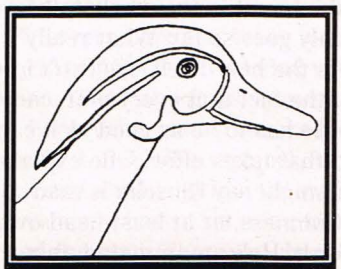
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dled, and dispensed in the market can wreak havoc with the quality in the glass.

"You know, we still occasionally find a pub dispensing beer with compressed air. That's absolute madness! An invitation to oxidation and trouble. We've got to worry about the publicans cleaning their beer lines, how they store the beer and serving it at the proper temperature, using the right gas to dispense, keeping the glasses clean. And we're doing it."

The Taste Test

Kinsella's crew employs a large arsenal of weapons in their fight against contamination and infection, including a brewery-wide quality assurance computer system. But computers can't taste Guinness. For that Kinsella holds court in the Guinness sample room. Tastings are important events at the brewery. Informal tastings go on all the time. And organized tasting panels convene once a week or so.

Kinsella explains that the QA team is careful to gather opinions about the beer from people within the brewery, but not just beer people. He has assembled a tasting panel that puts world-class brewers shoulder to shoulder with clerks, drivers, engineers, senior managers, and myriad other employees from all walks of life.

"The most basic research goes on right here in the sample room. You don't have to be a professional taster to join the panel and express your opinion about the beer. That's because the men and women who drink it out in the pubs are not professional tasters, either. But they know what they like and don't like," says Kinsella.

The sample room is something out of a beer-lover's fantasy: clean and bright, with technicians clad in white lab coats pulling miniature pints, small glasses shaped like the traditional Dublin pint jar. Dozens of shining taps stand at the ready. The beer is as fresh as it can be, dispensed at optimum conditions of temperature and pressure.

And boy, is it tasty.

"We rate the beer according to a scale of five. Five is perfect, few ever get that grade. Four is about the best we ever give, three is very good.

Anything below three is defective and will not be released. Even though a beer rated below three in here might be very drinkable, it's not good enough to be sold," Kinsella explains.

Nitrogen. It's a Gas, Man

Certainly one of Guinness' strong suits is its amazing, dense, creamy head. Around the brewery employees pay a lot of attention to the art of producing it properly. It's a home-grown effort. In fact Guinness people call its creation "the Dublin Dispense." What they mean, of course, is dispensing the beer, from draft or draft-can, charged with a mixture of nitrogen and carbon dioxide.

No other beer has a head quite like Guinness. It's a masterful invention of modern scientific thought, coupled with traditional techniques of production. Every time the classic Guinness head rises on a glass of draft Guinness pulled anywhere the world, it can be traced to three basic roots: raw barley in the mash, famous for its head-enhancing abilities in any beer; natural conditioning in secondary fermentation; and using nitrogen as a component of the beer's dispensing gas.

Anthony "Tony" Carey is one of the Dublin brewery's great scientific minds. Director of technical development, he has called Guinness home for 32 years, since graduating from the natural sciences program at Cambridge.

Carey has worked on a gunnysack full of interesting projects in his 32 years at Guinness. But one project holds a special place in the hearts of Guinness lovers. Carey is the man behind the widget: the inspired design of the draft-can system. He proudly displays the patent, granted in 1979, with his name at the top — along with other, now retired Guinness scientists.

Carey is quick to point out that the success of the draft-can is the result of many men and women working for years on its development. It just so happens that he invented it.

The draft-can is the latest in a line of gadgets designed to recreate the special creamy Guinness head, away from the pub tap and in more exotic markets outside Dublin. Some of these gadgets met with limited success. Some were failures. But each has at its heart a common element: nitrogen. That's the real secret behind the head. A trick that was discovered by an anonymous publican, quite by serendipity.

Carey explains in his elegant English accent. "We don't know his name. Perhaps it's best that way, more legendary. In any event Guinness used to be cask conditioned, like English real ale. But some of the publicans had trouble with the beer when it got too lively, too foamy," he says.



"As is so often the case, inspiration comes at the interface between product and customer. This enterprising publican kept the cask conditioning going but vented the cask to relieve pressure. He then devised a compressed-air system to dispense it. The head on his beer was denser, thicker, and creamier than his com-

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petitors. It was the nitrogen in the atmospheric air, dissolved into the beer, that made the difference," Carey explains.

By the 1960s most Dublin pubs were using the compressed air system. But at some cost. Oxygen in air, as all homebrewers know, spoils beer. To solve that problem, Guinness pioneered the use of the nitrogen/carbon dioxide mix in all their kegs and pub dispense systems. Guinness kegs are charged with 80 percent nitrogen, 20 percent CO_2 for the European market and 75 percent nitrogen for the US market. The difference is because it's stored colder in the US. Guinness is dispensed from half-barrel kegs at between 30 and 40 PSI pressure.

Perfecting the Can

Tracing the lineage of the draft-can, Carey flips through a book of pictures representing technological steps along the way. He also occasionally walks to his office marker-board to diagram a particular point about atmospheric pressure and bubble half-life. This guy really knows beer foam.

Previous draft designs include a disposable beer syringe that was supplied with six-packs of Guinness Bottle Draft. The consumer had to pour the beer, suck up a little in the syringe, then shoot it back into the glass. This introduced air and seeded a thick layer of creamy bubbles. Carey digs out a bar-mounted version of this device, which is still in use in at least two markets: Japan and Nepal. Another was the bar-mounted ultrasonic initiator, which held a full glass of Guinness and used ultrasound to seed the bubbles. "Both ideas worked but were economic failures. Just a little too clumsy to be widely accepted in the marketplace," says Carey.

When asked what is on his and his colleagues' current drawing boards, he replied: "Now that the draft-can system seems to be holding its own, we are very interested in developing a similar system for returnable bottles. If any of your readers have invented such a system, we would love to hear from them!"

The Spirit of Guinness

"One of the secrets of Guinness' success is an ethereal, mystical component of the beer: the commitment of the people who make it," says Carey.

Even the youngest college grads, trained in chemistry, engineering, and industrial management show deep respect and reverence for tradition — knowingly or not — when they make Guinness Stout.

That's because one thing hasn't changed at the Dublin brewery: the beer. Only minor modifications have been made to the recipe over the years. It's still unfiltered, unpasteurized. Still naturally carbonated the old-fashioned way. Still made from the most basic of raw materials.

John O'Sullivan, the Dublin brewery's manager of kegging and warehousing, puts it quite succinctly: "At the end of the day, it's the beer that makes or breaks us. People aren't stupid. They know good beer when they taste it. That's what keeps us on our toes. Keeps us doing it for real, not just talking about doing it."

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Make Those Enzymes Dance

by Ashton Lewis

Control mash thickness by varying the ratio of water to malt. Perfect this technique to tame the enzymes that cause important reactions in the mash, influence fermentability, and affect beer flavor.

The brewer's mash is the last step of many taken, prior to lautering, to produce wort from starch. The process begins in the malt house where barley is germinated and then dried. Malting gives the grain a rich complement of enzymes that are stabilized by kilning. Brewers must control these enzymes during mashing to produce a wort with specific features.

On the surface the brewery mash appears to be a simple mixture of malt and water. When held hot for a period the mash begins to thin, producing a cloudy, semi-sweet liquid, then transforming into a mixture of clear, intensely sweet wort and spent grains.

Beyond these macroscopic changes lie important biochemical reactions that convert the starch found in the grain into sugar. Malt enzymes act as catalysts, in a sense causing these reactions.

Mashing begins when malt solids dissolve. These solids are primarily made up of starch but also include a significant portion of proteins. Included among the proteins are the catalysts, malt enzymes. The enzymes latch onto mainly starch and smaller carbohydrate molecule chains in a mash, bringing about a chemical reaction. These starch and carbohydrates are called substrates, because they are broken down by the protein-based enzymes during the reaction.

Smaller proteins, smaller beta-glucans (viscous gums that contribute to wort viscosity), sugars, and dextrins (unfermentable carbohydrates that add body to beer) are the products of enymatic attack and their parent compounds — proteins, beta-glucans, and starch — are called enzyme substrates.

Water:Malt Mash Ratios - Metric to US

		Thick	Medium Thick			Thin		
Metric	Ratios	2:1	2.5:1	3:1	3.5:1	4:1	4.5:1	5:1
Metric	Liters	2	2.5	3	3.5	4	4.5	5
	Kilograms	1	1	1	1	1	1	1
US Equivalent	Quarts	0.96	1.2	1.44	1.68	1.92	2.16	2.4
	Pounds	1	1	1	1	1	1	1

Taking Charge

The brewer's challenge is to let nature travel its free-wheeling road but in a controlled environment.

Mash temperature, mash pH, water chemistry, enzyme concentration, substrate concentration, and product concentration are the mash variables that can be easily controlled.

Mash temperature has a great influence on which enzymes are active, because enzyme activity depends on temperature. Temperature also can cause enzymes to denature and permanently lose their catalytic activity. The principle enzymes involved in mashing all have different optimal temperatures.

Like temperature, mash pH affects enzyme activity. Enzymes must be in specific pH ranges to be active catalysts. In general the mash pH should fall between 5.2 and 5.4, because the enzymes of interest to brewers are active in this range. With most (already treated) brewing waters and malts mash pH naturally falls in this range, so pH is not one of the mash variables that demands vigilant monitoring.

Other attributes that affect enzyme action are the concentrations of

enzymes, substrates, and their products. These features are very important, because they influence the rate at which starch is broken down in the mash. As this reaction proceeds, the concentration of products (such as smaller carbohydrates) begins to build up and can slow down the reactions occurring in the mash. In addition to the speed or rate of the reaction, concentration can affect enzyme stability.

Water:Malt Mash Ratios - US to Metric

		Thick	Medium Thick			Thin		
US	Ratios	1:1	1.25:1	1.5:1	1.75:1	2:1	2.25:1	2.5:1
US	Quarts	1	1.25	1.5	1.75	2	2.25	2.5
US	Pounds	1	1	1	1	1	1	1
Metric Equivalent	Liters	2.08	2.6	3.12	3.64	4.16	4.68	5.2
Metric Equivalent	Kilograms	1	1	1	1	1	1	1

What Does It All Mean?

The concentration of enzyme, substrate, and product fall under the umbrella of "mash thickness." Mash thickness is the weight ratio of water in the mash to malt in the mash.

Since one liter of water weighs one kilogram, mash thickness is easily determined when malt is measured in kilograms and water is measured in liters. For example, if 12 liters of water go into a mash with four kilograms of malt, the mash thickness — or if you are British, the liquor to grist ratio — is 3:1. Although this is the most common way of expressing mash thickness, some brewers use the ratio of malt to water and express the ratio as a percentage. In the previous example the mash thickness could also be called 33 percent malt. In both cases it is simply the weight ratio of water to malt.

Although there are infinite mash thicknesses to use in brewing, three generic ranges of thickness are used in practice. These are the "thick mash," the "medium-thick mash," and the "thin mash." These terms do not define thickness in absolute terms, but they do convey some important messages to the brewer.

The Thick Mash

In a thick mash the concentrations of enzymes, substrates, and products are all high, since there is a bunch of malt in a little bit of water. In numerical terms a thick mash is anything less than about 2.5 parts water to one part malt. The rule of thumb for mash thickness quoted in many homebrewing books is one quart of water per pound of malt; as a weight ratio that is 2.1:1. That is a pretty darn thick mash!

The thick mash has certain ramifications. The most striking feature is that it provides substantial protection

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Pros and Cons of Mash Thickness			
	Thick Mash	**Medium-Thick Mash**	**Thin Mash**
Pros	Enzymes are very stable, even if mash temperature is greater than published optimal temperatures.	Good extract yield, easy to stir and pump. Product inhibition (build-up that slows important chemical reactions) is not a concern.	Good extract yield, easy to stir and pump. Product inhibition that slows chemical reactions is not a concern.
Cons	Extract yield may suffer because of product inhibition. Thick mashes are hard to stir and pump.	Enzymes are less stable at high temperatures compared to thick mashes. Overshooting target temperatures can cause problems.	Enzymes are very sensitive to high temperatures in thin mashes. Overshooting target temperature causes quick denaturation of enzymes.

to the enzymes present in the mash. In other words the enzymes are less likely to be denatured (stripped of qualities that allow it to catalyze the desired reaction) by high temperatures. This feature allows beta-amylase and alpha-amylase to work in concert, which is handy for a single-temperature mash. Without the protection of the thick mash, beta-amylase could be quickly denatured and the resulting wort would be predominated by the products of alpha-amylase action. Such a wort would have a high concentration of unfermentable carbohydrates. The resulting beer would have a higher terminal gravity and lower alcohol content than a beer made from a more fermentable wort.

On the Other Hand

Thick mashes do have obvious advantages, but there are some problems. Water is required to break down starch. Water is chemically inserted between the glucose molecules of the starch polymer during hydrolysis (the enzyme-directed breakdown of starch)

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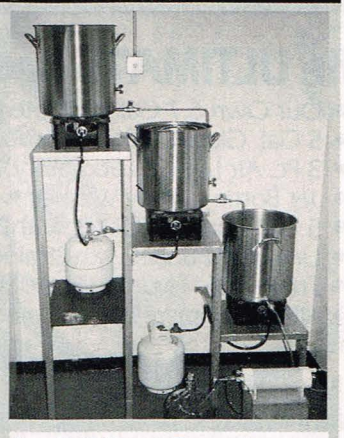
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and a shortage of water can cause incomplete breakdown of starch during mashing. Although mashes are rarely thick enough to cause incomplete starch conversion, very thick mashes can slightly decrease wort fermentability.

A less subtle result of thick mashes is noticeably lower extract yield. Thick mashes simply cannot bring all of the malt starch into solution. Although decreased extract yield is not going to send any homebrewer to the poor house, commercial brewers are not very fond of this side of the thick mash.

The last major problem with thick mashes is the high concentration of starch breakdown products. This feature is easy to spot when the specific gravity of the first runnings from the mash is taken. In thick mashes the first running gravity is usually greater than 20° Plato (1.078). These products can interfere with enzyme action, resulting in what is called product inhibition.

Product inhibition may serve to control the millions of enzymatic reactions occurring every second in the human body, but it is not the brewer's best friend. In the mash, product inhibition can lead to incomplete starch breakdown and decreased extract yield and fermentability.

Some enzymes, especially proteases (enzymes that attack protein), are very sensitive to product inhibition and are not very active in such environments. Periodically stirring a thick mash can help to alleviate product inhibition, since stirring distributes the enzymatic products that naturally accumulate near enzymes.

Medium-Thick Mashes

If a mash thickness less than 2.5:1 is thick, then a mash thickness between 2.5:1 and 4:1 should be medium. In practice a thickness of about 3.25:1 best captures the feel of the medium-thick mash. These mashes retain many advantages of the thick mash but few of the downsides. Additionally, mashes in this range of stiffness are easy to move around. This feature is important when conducting stirred, multi-temperature mashes as it allows for easier mixing and better heat transfer than a thick mash. These mashes are easy to pump, if required. Commercial breweries, for example, pump the mash from the mash vessel to the lauter tun.

Although thinning out the mash makes the enzymes less concentrated and hence more susceptible to temperature denaturation, this only occurs if the mash is conducted at an unacceptably high temperature. In general an infusion mash temperature of 150° to 155° F in a medium-thick mash allows sufficient beta-amylase activity before rendering it inactive (beta-amylase usually begins losing activity above 149° F).

After beta-amylase is denatured, alpha-amylase remains active because it is less sensitive to these temperatures, it can survive up to 170° F. If multi-temperature mashing is used, then these problems are alleviated, regardless of thickness. But the thinner mash makes stirring easier.

The thinner mash also decreases the concentration of substrates and products. This minimizes the effects of product inhibition, the slowing of

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chemcial reactions caused by build-up, and also eliminates the loss of extract associated with very thick mashes.

In general the medium-thick mash provides for good enzyme activity, allows for easy stirring and pumping, will produce a wort with a high degree of fermentability, and produces a good extract yield from the malt. However, if a mistake is made by mashing in too hot, then the chance of causing irreversible enzyme loss is higher than if the same mistake is made in a thick mash.

Thin Mashes

Thin mashes are any mashes where the water-to-malt ratio exceeds 4:1. Like the medium-thick mashes, thin mashes are easy to move around and provide excellent heat transfer. They also give high extract yields, since the malt solids are easily dissolved.

The problem with thin mashes is enzyme stability. Enzymes are less stable in a thin mash and denaturation can become a real problem. The enzyme of concern is beta-amylase, since there is a limiting supply of beta-amylase in comparison to alpha-amylase. If beta-amylase denatures too quickly, then the resulting wort will have a decreased fermentability.

Some multi-temperature mash schedules suggest adding very hot water to increase temperature. This technique thins the mash and can render enzymes, especially beta-amylase, inactive when they are most needed. You may not like this method unless you want to limit fermentability.

Into The Thick Of It

It may seem like the logical conclusion is to only use thick and medium-thick mashes. But for some special cases thin mashes may do just the trick. Suppose the goal is to produce a wort with good extract yield and a negative iodine reaction but with low fermentability (such as a low-alcohol beer).

Some brewers try to accomplish this goal by mashing at a very high temperature in hopes of killing off most of the beta-amylase before producing much maltose. In thick and medium-thick mashes, high temperatures are not as destructive as may be expected. Most of the so-called optimum temperatures for enzymes are for model systems carried out in laboratories. Since these temperatures are usually not representative of mashing conditions, exceeding text book numbers does not always do the trick.

This is where varying mash thickness becomes an effective method of wielding control over the mash. To limit fermentability, a thin mash coupled with high temperatures (say 160°F) may be more effective than mashing at 170° F in a very thick mash.

This topic has become of interest to many commercial brewers in recent years who have taken an interest in low- and non-alcohol beers. Although homebrewers are usually not looking to produce bland, low-alcohol products, some are dabbling with full-flavored but low-alcohol beers such as some mild ales. If these beers have tickled your taste buds, then mash thickness control may be the parameter you've been looking for to brew low-alcohol beers without sacrificing body.

The next time you're mashing, consider mash thickness in addition to temperature and pH as one of the parameters that sets the stage for the dance of the enzymes.

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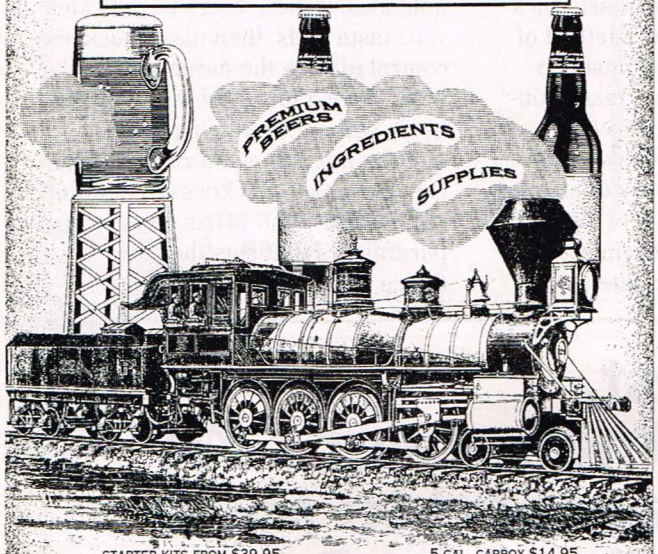
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CIRCLE 58 ON READER SERVICE CARD

D is for diacetyl

The second installment of a continuing series on beer and brewing terms.

D

decoction mashing - the method of removing some of the mash, boiling it, then returning it to the main kettle to boost the mash temperature in all-grain brewing.

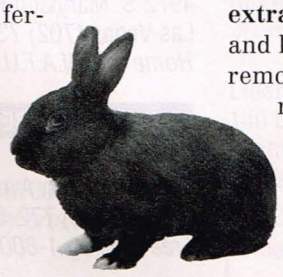
dextrose (or **glucose**) - a monosaccharide used to prime bottle-conditioned beers.

diacetyl - a powerful aroma compound derived from yeast that can impart a butterscotch or buttery flavor to beer. *Diacetyl may not be good in beer, but it's great over movie-theater popcorn.*

doughing in (or mashing in) - mixing ground malt with water, the first step in all-grain brewing.

draft (or **draught**) - beer drawn from kegs or casks instead of being bottled.

dry hopping - adding hops to the primary or secondary fermenter (or to finished beer) to increase the aroma and hop flavor of the beer without increasing its bitterness. *I dry hopped my Easter ale and called it "Bugs Bunny Beer."*



dry kit - a homebrewing kit that contains dry malt extract, hops, and sometimes specialty malts.

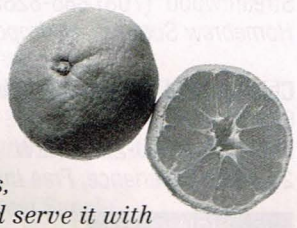
dry malt - malt extract in a dried, powder form. Often called DME.

E

effervescence - the bubbling in beer caused by dissolved carbon dioxide gas.

enzyme - a protein that acts as a biological catalyst for chemical reactions, such as alpha-amylase, which converts starch to maltotriose and dextrin sugars, or beta-amylase, which converts dextrins to simpler sugars: maltose, glucose, and smaller dextrins.

esters - powerful flavor compounds formed by the combination of organic acids and alcohols during fermentation. They contribute fruity aroma to beer. *When a beer is high in esters, go ahead and serve it with cheese.*



extract - the sugar left after mashing and lautering malted barley. By removing the liquid, sweet wort is reduced to a syrup or powder and packaged in cans for homebrewing (called malt extract). *My dentist brews with extract but I try not to let him extract near me!*

extract brewing - making beer from malt extract syrup or powder as opposed to unprocessed malt (which is used in all-grain brewing).

F

fermentation - the process by which yeast collects energy in the absence of oxygen by breaking sugar into carbon dioxide and alcohol.

filler - a machine that pours liquid into bottles or other containers. *I used to use a funnel, now I've got a filler. I only changed a few letters, but it saves lots of time.*

filtration - the process of removing suspended solids, primarily yeast and proteins, to produce a brilliant beer. Usually performed just before bottling.

final gravity (or **final specific gravity, apparent extract**) - the specific gravity of a beer when measured after fermentation is complete. *Some say final gravity is the sucking of the earth at the end of time.*

fining - the clarifying process in which a settling agent (or fining agent) is added during wort boiling or secondary fermentation to bond with suspended particles, causing them to sink to the bottom.

finings (or **fining agents**) - material added to ensure a clear beer, such as Isinglass, gelatin, Irish moss, bentonite, or egg whites.



finishing hops - hops added to the wort toward the end of the boil to impart aroma and character but not to increase bitterness (see dry hopping).

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Reach a huge homebrew audience cost-effectively in the NEW Homebrew Directory. Contact Rebekah Darksmith directly at (916) 758-4686 for all the details.

flakes - unmalted adjunct grains in flake form added to the mash with ground malt. Used to reduce cost and produce lighter, less malty beers.

flocculation - the clumping of yeast cells toward the end of fermentation, causing them to sink to the bottom and improve clarity.

food-grade - level of plastic quality suitable for storing food. In homebrewing, this high-density plastic is excellent for use as a fermenter. Lower-quality plastics can leech unpleasant flavors into the beer. *I thought about brewing in my garbage can, but it's not food-grade plastic.*

froth - foam, fob, or head.

G

gelatin - a colorless and tasteless protein used as a fining agent. *I wanted to make a fruit beer, so I put Jell-O in the fermenter instead of gelatin.*

gelatinization - the transformation of starch from a solid, crystalline form to a liquid, soluable form. It occurs when starch is heated in water. Gelatinized starch can be attacked by mashing enzymes whereas un-gelatinized starch cannot.

grist - crushed malt and adjuncts mixed with hot water used for mashing.

growler - a container like a jug once used to carry draft beer purchased at the local tavern. *He used the growler to bring beer to his favorite dog, Pitcher.*



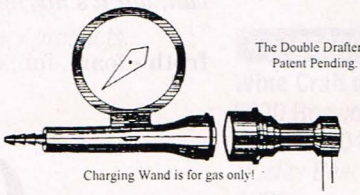
gypsum - hydrated calcium sulfate used to treat soft or neutral water, making it hard. *Gypsum travels the world, hardening water and reading fortunes.* ■

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The *Double Drafter* now includes an easy to use charging wand that plugs into a standard disconnect. When ordering please specify 28 MM or 38 MM screw tops, and ball or pin type Charging Wand.
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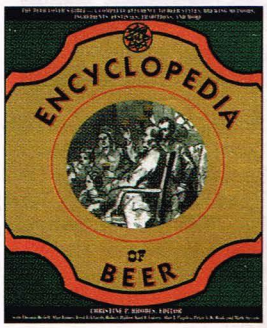
We wholesale our hops, hop products and fruit flavors to retailers and microbreweries. Please inquire.

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It's a Buyer's Market

The Brewer's Bookshelf

The Encyclopedia of Beer by Christine Rhodes is a compendium of facts and information from around the world, all relating to (you guessed it) beer.



Reaching from the pre-Christians and their boosa (a bread-based beer) all the way to today's professional competitions, this tome is not for the teetotaler. But it is an exhaustive reference with contributions from some of the beer world's heavyweights (hey, no insult intended, you guys): Fred Eckhardt, Alan Eames, Karl F. Lutzen, the Internet's own Mark Stevens, and more.

Published by Henry Holt and Co. Check your local bookstore.

It Could Happen to You

The Homebrewer Challenge of 1996 offers you the chance to win a pair of leather pants and a shot at world glory! That's right, the grand prize in Schneider Brauerei's contest is a pair of brewmaster's lederhösen. The challenge: Brew one batch of "traditional German wheat beer" and one batch of "traditional German wheat doppelbock" using the yeast found at the bottom of their Schneider Weisse and Aventinus beers. (Yes, that means they bottle with the same yeast they use for brewing!)

For more contest information contact B. United International at (914) 345-8900.

A Magic Improvement

Sabco has designed its newest Brew Magic system with a heavy, stainless steel false bottom around a new clover-leaf siphon assembly to



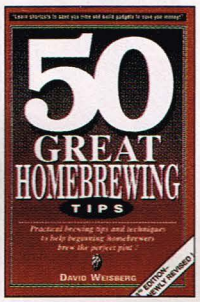
make it easier to clean and increase its accuracy. This system may not be magic, but it's a dream of a tool for anyone's brewery.

Sabco has also made the same improvements on the mash kettle designed for homebrewers, so you can get a professional quality system in your own home.

Order through your local homebrew shop, or call Sabco at (419) 531-5347. Visit their website at http://www.kegs.com or send e-mail to sabco@kegs.com.

Third Time's a Charm

50 Great Homebrewing Tips by David Weisberg is newly revised and in its third printing. The guide offers simple, straight-forward advice aimed at beginning to intermediate homebrewers.



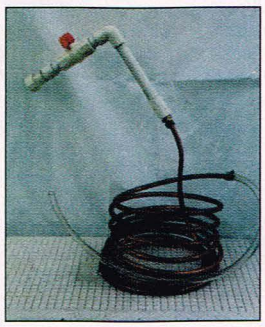
Contact Lampman Brewing Publications at 1-800-487-2794.

Untangling the Web

If you're surfing for brewing information, hop over the pond to Edme's newly revised site. It's chock full of valuable support for homebrewers who use their wide range of kits, extracts, and equipment. Take in the FAQ's (online-speak for frequently asked questions), recipes for various brewing levels, and tasting notes, then jump off to a range of other brew sites that are linked up. Their Netscape-friendly pages can be found at http://www.ip7.co.uk/edme/

Hot Chiller

Looking for the right wort chiller? Cast your eyes in this direction. Quality Homebrew Supplies is offering the Copper Wort Chiller. It's got an easy-to-handle on/off valve and a 17-foot, 3/8-inch copper coil, which means your wort will be cool by the time it gets from here to there.



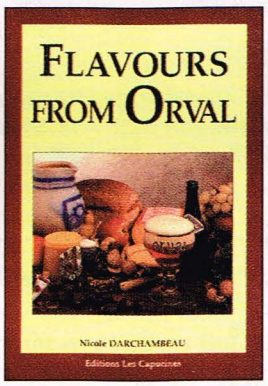
They say that your five-gallon carboy will take a scant four minutes to reach pitching temperature.

Contact Quality Homebrew Supplies at 1-800-366-0076 for information.

The Fuggle Gourmet

Cook with one of the world's most unique and interesting beers, Orval. Chef Nicole Darchambeau has devised recipes to complement Orval, which is produced at the Abbeye d'Orval (Orval Abbey) in Belgium.

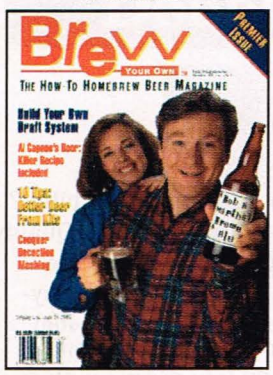
Flavours from Orval contains a brief history of the Benedictine Abbey as well as attractive illustrations for its recipes (some of which also employ Orval bread, honey, and cheese, also produced at the Abbey). A delight for any gourmet, it offers more-available substitutes for its hard-to-obtain ingredients and gives information on touring this special brewery.



Call Liberty Malt to order at 1-800-990-6258.

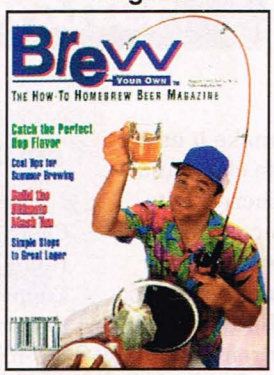
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Premier



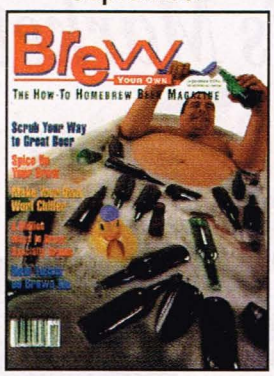
- 10 Tips for Perfect Kit Beer.
- Plunge into Liquid Yeast.
- Decoction Mashing Demystified.
- Brewing Basics for Beginners.
- Build a Cornelius Keg System.
- Prohibition Pilsner: Brew Al Capone's Beer.
- Shopper's Guide to Beer Kits.
- Style of the Month: Fruit beer.

August



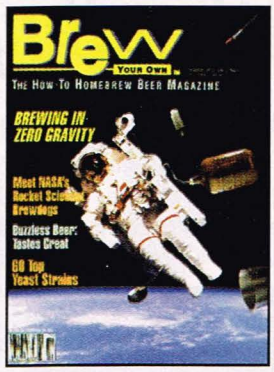
- Get the Full Effect from Your Hops.
- Lagering: A Step-by-Step Guide.
- Keep Cool for Summer Brewing.
- Build a Mash/Lauter Tun.
- Hops: How They Effect Beer Flavor.
- Priming Primer: Tame Unruly Carbonation.
- Style of the Month: Märzen.

September



- Germ Warfare: Sanitation Guide.
- Add Spice to Your Beer.
- Specialty Grains for Great Extract Brews.
- Build a Wort Chiller.
- Malt: How It Effects Beer Flavor.
- Homebrewers Who Turned Pro.
- Finder's Guide to Bottles.
- Style of the Month: Brown Ale.

October



- Brewing with Astronauts and Other Out-of-This-World Beer Tales.
- Brew a Great Non-alcoholic Beer.
- Taking Your Beer's Specific Gravity.
- Build a $100 All-Grain System.
- Controlling Yeast Flavors.
- How-to Guide to Yeast.
- Foolproof Methods of Recipe Calculation.
- Style of the Month: American Pilsner.

November



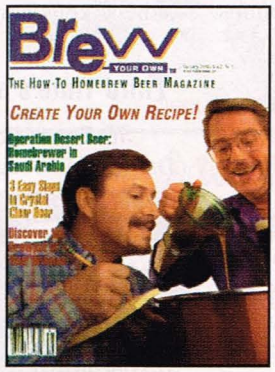
- Mash Basics for Beginning All-Grainers.
- Pumpkin Beer.
- Build a Counterpressure Bottle Filler.
- Yeast Farm: Guide to Culturing Your Own.
- Organic Brewing.
- Racking Tips and Gadgets.
- Homebrewing Computer Software.
- Style of the Month: Porter.

December



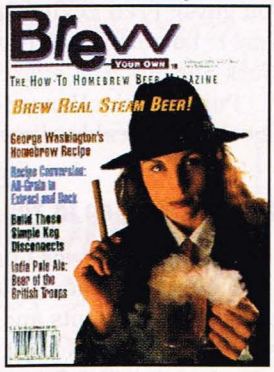
- Controlling Beer Color.
- 20 tips for Better Homebrew.
- Aeration: Breathe Life Into Your Beer.
- Great Recipes for Winter Beer.
- The Homebrewer's Dream Christmas List.
- Pros Who Brew with Extract.
- Style of the Month: Barleywine.

January



- Create Your Own Recipe.
- Operation Desert Beer: Homebrewing in Saudia Arabia.
- 3 Easy Steps to Crystal Clear Beer.
- Discover the Brewpot of Your Dreams.
- Expose Yourself to Open Fermentation.
- Build Your Own Sparge System.
- Style of the Month: Bock.

February



- Brew Real Steam Beer.
- Revolutionary Brewing, Including George Washington's Recipe.
- What Makes a Style a Style.
- Make Your Keg System User Friendly.
- Recipe Conversion: All-Grain to Extract and Back.
- Behind the Scenes at a Brewery Lab.
- Style of the Month: India Pale Ale.

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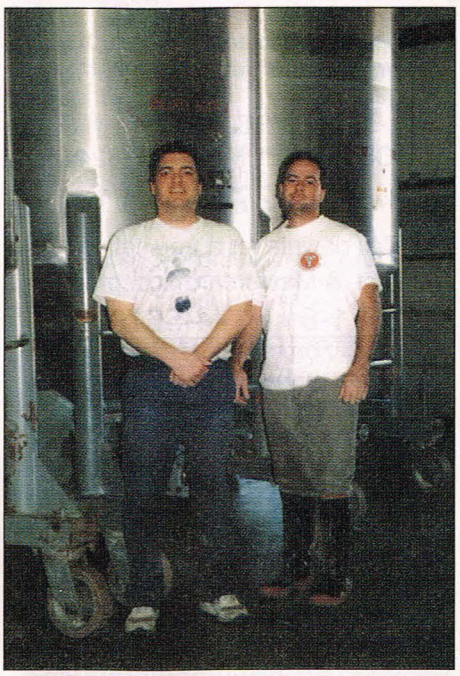
Blind Man Ales: Brewery on Wheels

by Steve Johnson

"Incredible!" That was my reaction when I heard there was a microbrewery with fermenters mounted on wheels. As I thought about it, two questions came to mind. Why would anyone want to move a fermenter in the first place? Wouldn't it be too heavy to move? My curiosity was piqued. Since the brewery was in Athens, Ga., less than a two-hour drive from my home, I drove over to check it out.

When I arrived, my questions were answered in short order. The fermenters *did* have wheels. The brewer hadn't wanted to move them at first — that's just the way they came. And finally, two grown men can move them when they are full of beer. Owner Bob Tibbs says, "When the fermenters are empty, even my four-year old son can push them around." The wheels and everything else about the brewery are a demonstration of how two people put their creative minds together to solve one basic problem: "How can we build a brewery on a shoe string?"

The idea came to Bob in January 1995. For several years he had been thinking about starting his own business. But what? He wanted to do something different (his occupation at the time was in the photocopier-fax machine retail business). It had to be something that was profitable, had a future, would be fun, and...well...had some kind of karma.



STEVE JOHNSON PHOTOS

Inspired by a dream of cows and blind men, John Gayer and Bob Tibbs launched their Blind Man Ales brewery on a shoestring budget.



The rolling fermenters travel from brewing area to cold room to cleaning area, so the brewery can do without expensive beer lines and a drainable sloped floor.

One night it came to Bob in a dream. He sat bolt upright in bed. He knew what he would do. Start his own brewery! Had Bob ever made beer? No. Had he ever been in a brewery? No. Did he have the money to start a brewery? No. Did he let these little details get in his way? No!

The first thing Bob did was go to the nearest homebrew supply store. That was Athens Homebrew Supply, owned and operated by John Gayer.

John got started homebrewing back in 1991, when such activity was illegal in Georgia. When it was legalized in 1993, he entered the first homebrewing

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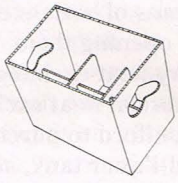
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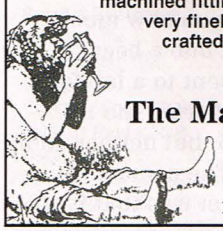
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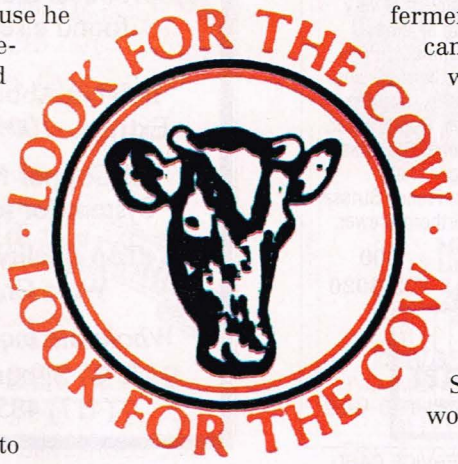
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competition in the state and took first place for his barleywine in the specialty category. With his confidence buoyed, John opened a homebrew supply business, which he operated out of his home. Because he didn't have a storefront, he delivered supplies to his customers, and because most of them were just beginning, he spent a lot of time teaching them the essentials of beer making.



The business grew quickly, but to make ends meet, John also delivered pizza. By September 1994 sales had grown to the point where he could open his own storefront. When Bob walked into the shop, he found in John someone who had the knowledge, enthusiasm, and willingness to begin a commercial brewing adventure.

Bob and John set out to construct a brewery on a shoe string. They say necessity is the mother of invention, and this was no exception. A commercial turnkey system was way out of their price range, so they put together a system catch as catch can. Bob describes it as "a glorified homebrew set-up."

They acquired a gas-fired, secondhand tofu cooker for a brew kettle. A mash tun was considered an expensive and nonessential piece of equipment, so they decided to forego making beer from grain and use malt extract.

They found six 35-barrel tanks with conical bottoms through a secondhand equipment broker to use as fermenters. Because of the head space required for a full kraeusen, they only make 15-barrel batches in each fermenter.

The tanks did not have cooling jackets. To avoid the expense of retrofitting the fermenters with a glycol cooling system, they decided to construct a cold room to house the fermenters. The problem was, they didn't have the money to build a proper cold room. So they constructed a frame out of inexpensive plastic tubing and then hung plastic sheets from it. An air conditioner was placed inside the structure. The air conditioner maintains the fermenting beer at 65° F.

The oddest thing about the fermenters was that they came equipped with wheels. Bob and John put those wheels to good use. To avoid purchasing expensive beer lines to transfer the wort from the brewing area to the cold room, they merely rolled the tanks back and forth. Sounds crazy, but it worked like a charm.

Another good investment was two rubber, 100-gallon horse troughs. They use them primarily for keg cleaning, as well as for cleaning equipment and soaking the cans of malt extract in hot water before opening them, and also as a secondary heat exchanger. They have a commercial heat exchanger, but could not afford to purchase a jacketed, cold-liquor tank, something considered essential in the deep South. Using tap water in the heat exchanger only brought the hot wort down to about 80° F; too warm to pitch the yeast. So they filled up one of the horse troughs with chipped ice and ran the wort through it using coiled copper tubing. This brought the wort down to about 65° F.

Bob and John's first product was Blind Man Ale, made with Alexander's pale malt extract, Mt. Hood hops for bittering, and Cascade for finishing. John says laughingly, "We originally intended it to be a cream ale. I felt it was good, but it needed some more hops. We added more hops, we added more hops, and added more hops until it was mostly hops. We use Cascades for flavor, Cascades for aroma, Cascades to dry hop, and Cascade hop oil when it's going into the keg. Blind Man Ale is an experiment on how much Cascade you can get into a beer."

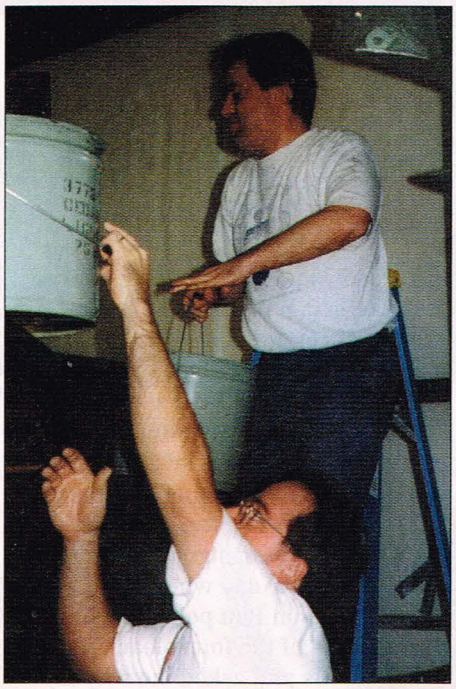
One batch was sent to a lab for analysis. The lab reported the IBU level was around 65, but neither John nor Bob believe it. The comment noted on the lab form was that it was

like "walking through a hop kiln." Bob adds, "No one has accused us of being dainty with our beers."

John says they use pellet hops in the kettle and whole-leaf hops in the fermenter. Instead of placing the hop leaves in a nylon bag, they just toss them in on top of the kraeusen. When the beer is transferred into their racking tank, they pass it through muslin to screen out the big chunks of hops.

Because the fermenters cannot be sealed to create pressure, John lets the beer ferment out as much as possible, the way a homebrewer would. They boil corn sugar with five gallons of water and then pour into the racking tank. The flat beer is pumped in on top of the sweet liquid to stir it up. The beer is then racked into kegs, where it conditions naturally for a minimum of two weeks.

The day I visited Blind Man Ales was a historic day for the brewery. Bob and John were making their first batch of Blind Man English Ale. Instead of the Alexander's, they used Munton & Fison pale malt extract and mashed in about 50 pounds of crystal malt. For bittering they were using an American variety of high-alpha hops. For flavoring and aroma they were going to use Fuggles and then dry hop it in the fermenter with East Kent Goldings. I couldn't stay to see the entire process, but before I left we cracked open a couple of bottles of Blind Man Ale, which I found was a hophead's delight. I personally like Blind Man Ale very much. Some might say it has too much hops. Others will say there is no such thing as too much of a good thing.



With help from Bob Tibbs (bottom), John Gayer dumps a bucket of extract into the secondhand, gas-fired tofu cooker that serves as a brew kettle.

The wheels are not the only curious thing about the brewery. There is also the name — Blind Man Ales — and the company logo, which has a cow in it. When I asked Bob about these, he said they both went back to that mysterious dream. It had a blind man in it, and a cow. He wouldn't elaborate any further. Of course, I asked him these questions before we sat down to the Blind Man Ale. Next time, I'll ask after the beer.

If you are ever in the Athens or Atlanta area, be sure and stop by one of the good beer bars to try some Blind Man Ale or Blind Man English Ale. If you would like a tour, give the brewery a call at (706) 613-7070. ■

Steve Johnson lives in Clemson, S.C., and is author of three brewery guidebooks: On Tap: a Field Guide to North American Brewpubs and Craft Breweries, On Tap New England, *and* On Tap Northern California.

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Clothes that Make the Man

by Samuel L. Piper

You can usually see by my outfit that I am a brewer. What do you wear that tells your story? Some say that if you are true in spirit and deed that your clothes will give you away. Sherlock Holmes astonished his clients and competitors alike through his feats of instant visual analysis, as in *The Adventure of The Norwood Builder*. Holmes announced to John Hector McFarlane, who had just burst into Holmes study on Baker Street, "You mentioned your name as if I should recognize it, but I assure you that, beyond the obvious facts that you are a bachelor, a solicitor, a Freemason, and an asthmatic, I know nothing whatever about you."

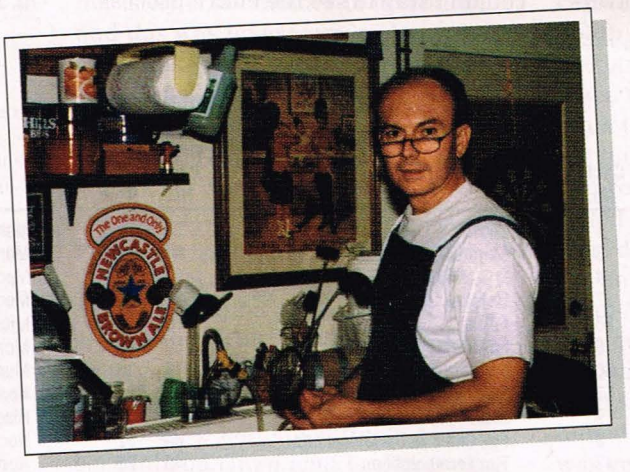
In this age of conspicuous wealth, when most people can afford a closet full of recreational clothes, many of us dress incognito, taking on appearances that belie our true nature and occupation. We vacillate between the chameleon in us that needs to blend in and our spirit's need to be recognized as a unique person on a planet of more than four billion human beings.

While I have always been a fairly casual person, not caring a whole lot what I wear, I've become conscious lately that the further I get from college (where I had no money and no clothes) the more I care to wear the right clothes for the occasion. Which is sometimes hard for me to accept after all the proletariat hell I raised as an undergraduate, but talking about it helps, so here I go.

As beer and brewing take on a bigger part in my life, they also begin to dominate my wardrobe. For example I have perhaps 17 t-shirts, of which maybe five do not have a beer motif of some kind. And while I have yet to see brewing pants advertised (perhaps they should have embroidered on the seat, "If you can only rent beer, then I'm a Leasing Agent"), I have noticed that I keep one pair of denims set aside for dressier occasions. If I didn't, they would be full of bleach stains like my others.

This is a perfect example of where my priorities lie, for while I have ruined a lot of blue jeans and sport shirts, I have yet to scar any of my beer shirts. I was poignantly reminded of this the other day when my 10-year-old son Ben poked his finger through one of the four bleach holes in my cutoffs and asked me why my pants were rotting.

I do have an outfit for what I call "formal brewing." My grandfather, Leo B. Niehe, was a homebrewer for some 50 years and always wore an apron made of denim when he brewed. Grandfather had been a shoe repairman and even had his own store before the great depression, and I suspect that the apron came from his days as a cobbler. It was a classic design. The right shoulder loop connects to the left waist and vice versa, so that it naturally fits your form and you don't have to learn yoga tricks to tie it behind you. Sometime after it became apparent to my family that I was serious about brewing, my aunt sent me Grandpa's apron.



Usually, Grandpa Niehe's denim apron remains folded and put away, "kind of my personal shroud of Tuborg," says the author. He brings it out only on special brewing occasions.

You can imagine what that means to me today. I never got to brew with Grandpa as an adult (although as a kid I poured cans of malt into his crock), so the pieces of his brewery that I have inherited are extremely special. So special, in fact, that I only do "formal brewing" on special occasions, knowing that I could easily ruin Grandpa's apron along with the rest of my clothes.

But there are those days when his spirit begs to be present in the brewery in all its glory. You may know what I mean — those times when you're brewing from a spiritual need to connect with something. For me that something is a tradition of brewers who have worked quietly over the centuries to create a good beer in their home. And when I put on Grandpa Niehe's apron, I smell the must and mildew of his cellar on Clifton Avenue in Cincinnati, and I can almost hear his voice saying, "You boys leave the top on that crock or you'll spoil my beer." Then I see Grandpa sitting in his rocking chair, a pitcher of pale prohibition beer on the end table, just like his grandson drinks his homebrew today.

I guess I'll have to mosey over to Sears or somewhere and see if I can't find a similar apron. It does look kind of neat when I wear it in the brewery, with the cauldron bubbling, a hydrometer floating in the cylinder, hops pouring into the can on the scale. Then there's me, walking around in an apron and gloves with a satisfied expression on my face. ■

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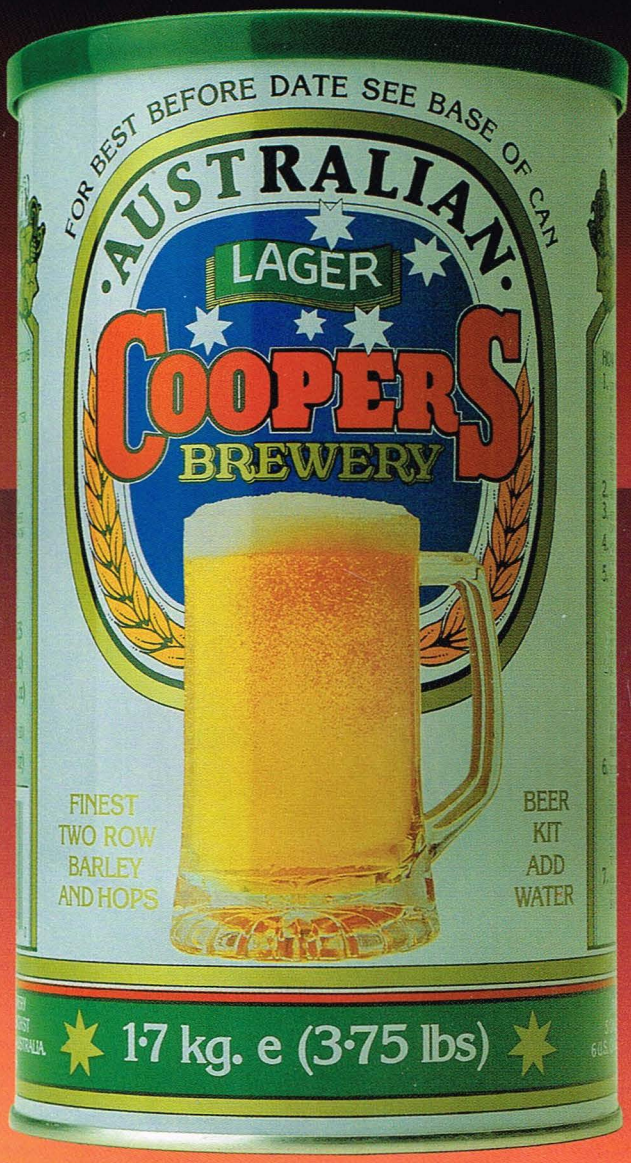
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