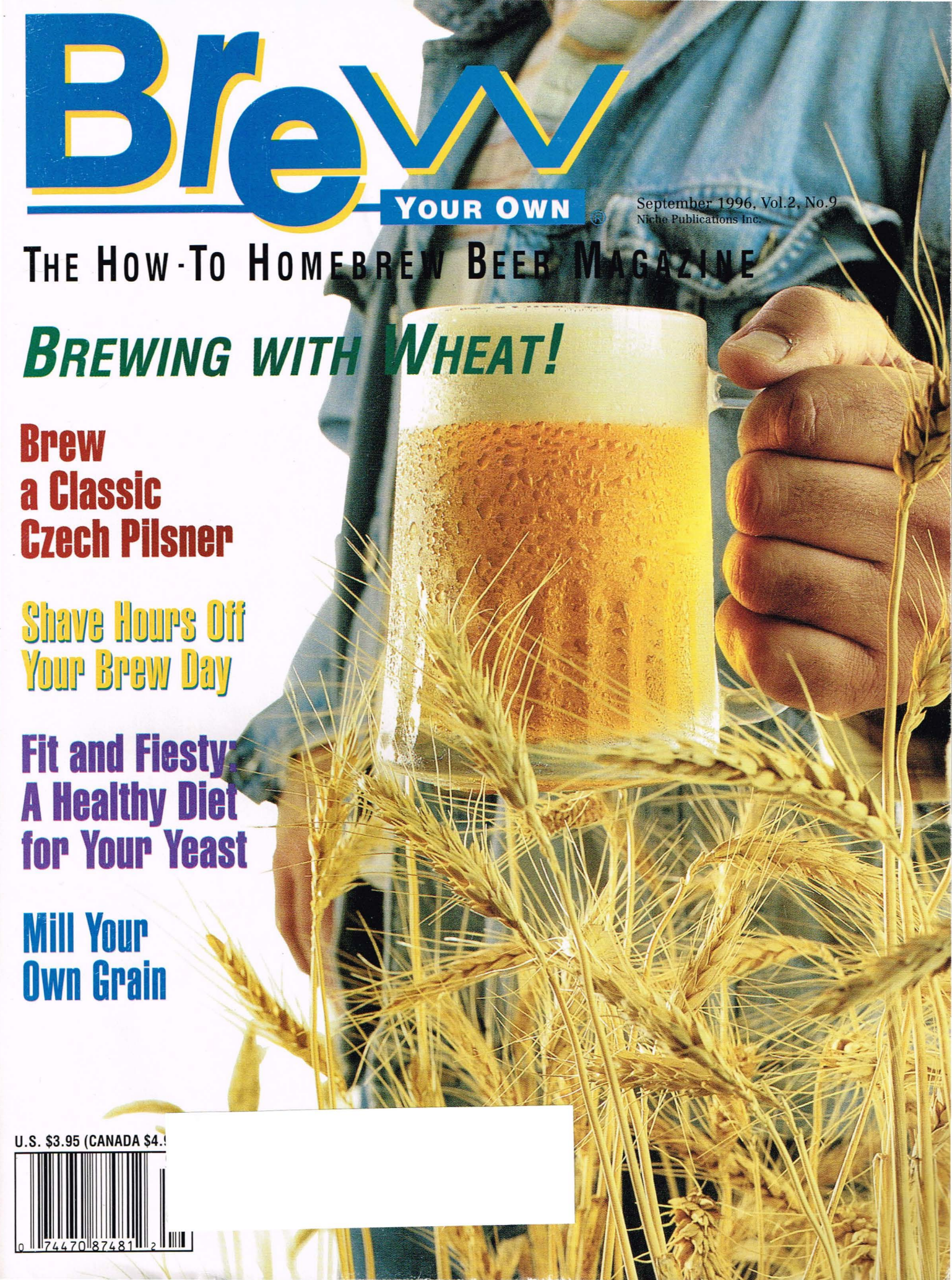
Brew Your Own

September 1996, Vol.2, No.9
Niche Publications Inc.

THE HOW-TO HOMEBREW BEER MAGAZINE



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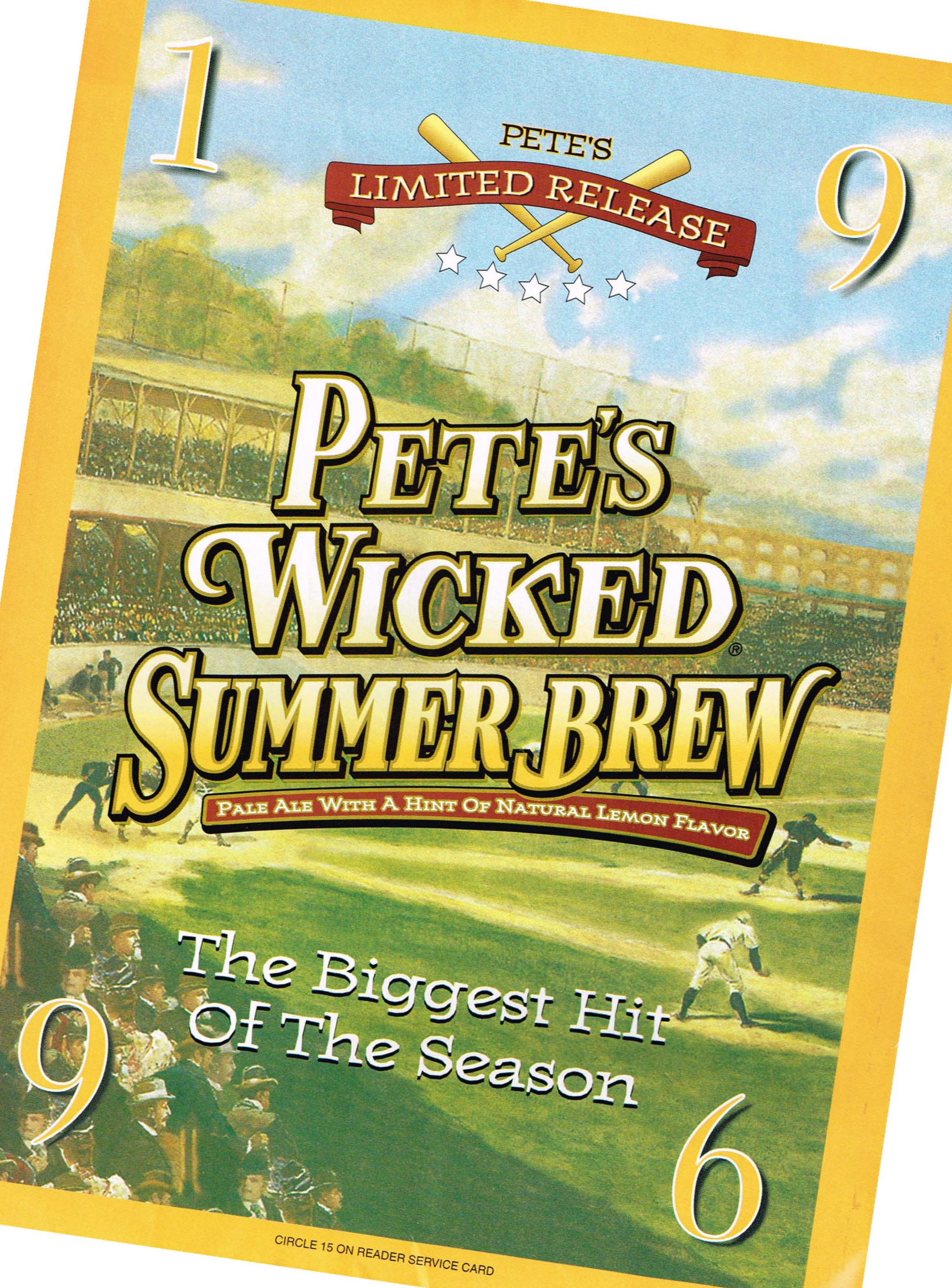
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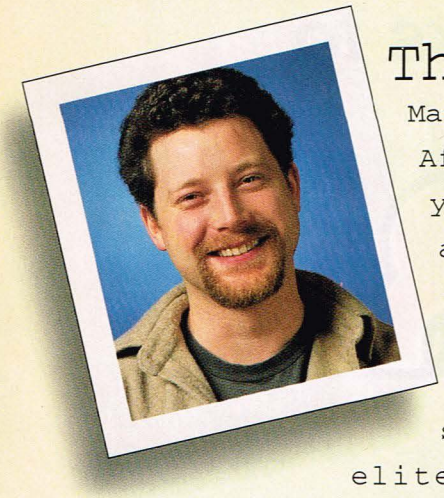
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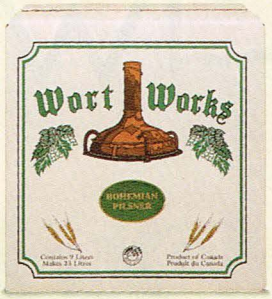
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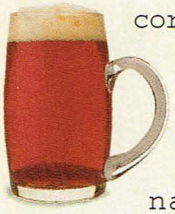
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This is Sean. He's our beer guy.

Matter of fact, around Brew King, we call him "The Beer Guy". After all, he knows a thing or two about beer. And as you can see, he's pretty happy right now. Why? Because after months of self-imposed exile in Brew King's (windowless) brewing lab, Sean has emerged with Wort Works, an all-malt brewing kit of pure perfection - even by Sean's standards. You see, Sean belongs to that elite group of home brewing purists - the ones that scoff at most commercial brews and insist on choice natural ingredients for their own brewing masterpieces. With Wort Works, Sean would never cut corners. So what has Sean created? A totally unique, bag-in-a-box packaged product offering 9 litres (2 gallons) of concentrated wort made from 100% barley malt with naturally processed hops and filtered Canadian water, fully boiled in our 1000 gallon brew kettle. Sean even insisted on including a special dry hop package for extra aroma and flavour. And true to form, his instructions are comprehensive, even with information on the specific ingredients used. Sean's no dummy. He made Wort Works with his fellow homebrewers in mind, but he also made sure that its user friendly, no-boil method would be perfect for beginners too. Keep Sean happy. Make his Mom proud. Try Wort Works. The results will make you (and your friends) happy too.











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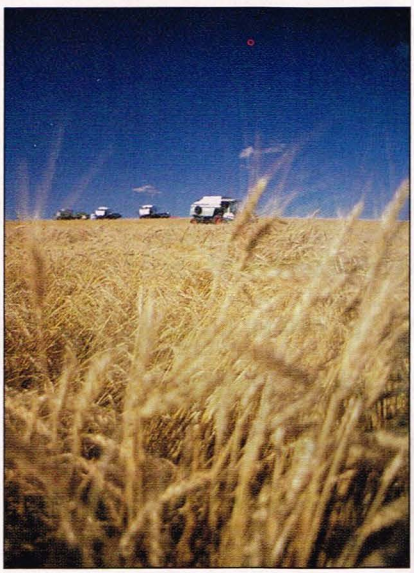
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Cover photo: Kent Lacin

Make Me Laugh

How come there are no homebrewing jokes? Almost every homebrewer I've met enjoys a good laugh — it goes with the territory. But did you ever hear Leno tell the one about Madonna and the homebrewer? Or Letterman list the top 10 ways Bob Dole enjoys a homebrew? No. I don't think we've even made it to Conan O'Brien yet.

So what's the problem? Maybe they just need a little inspiration.

"I want to show you something," a homebrewer said to his friend as they walked into the kitchen.

There at the stove, standing on his hind legs and stirring a brew kettle, was the homebrewer's dog, Barley.

"That's amazing," said the friend. "A dog who homebrews!"

"Yeah," replied the homebrewer. "He makes great beer, too. Only problem is, he's kind of limited."

"What do you mean?" asked the friend.

"Well," the homebrewer replied, "All he can do is bock."

Maybe you prefer a joke with a classic construction.

Question: How many homebrewers does it take to change a light bulb?

Answer: Two. One to stir the wort and one to build the Automatic Rotating Light Bulb Infusion System.

Then there's the quick hit:

"I like Bob, but he's a lousy homebrewer," said Jim. "His beer has so much yeast bite you need a rabies shot before you let it out of the bottle."

And quick hit with bad pun:

Did you hear about the homebrewer who added too much hops? His beer was so bitter it sued for ale-imony.

Okay, are you laughing yet? I hope so, because if homebrewers don't laugh at homebrewing jokes, who will? Perhaps you're thinking, "I can do better."

Fine. Here's the challenge: Make me — and our fellow homebrewers — laugh. Send your best joke to me by October 1. I'll send a cool Brew Your Own T-shirt to the five people who make me laugh the loudest. Contest rules: Only one winner per family, as they say. Decision of the judge is final. And while off-beat jokes are welcome, you can't win if we can't print it.

Now, back to our regularly scheduled program.

Did you hear about the homebrewer who was dating Madonna? For his birthday she gave him a two-vessel, conical brewhouse and a fishnet straining bag.

And speaking of famous people, you probably know that Bob Dole, in an effort to appear younger and more hip, started brewing his own beer. He wanted to make sure everybody knew it was his, so he named it "Bob Dole."

One day on the campaign trail he was telling a voter about it, and a reporter overheard the conversation. The next day the headline read: " Bob Dole: A Little Stout, Moderately Bitter, a Good Head, and Doesn't Give You Gas."

And finally, in the interest of equal time: What do you get when you cross a homebrewer with Bill Clinton? A beer you can't inhale.

You can do better than this, can't you? Send your best joke to me at BYO, 216 F St., Suite 160, Davis, CA 95616. E-mail it to BYO@byo.com, or fax it to (916) 758-7477. I'm ready to laugh.



Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

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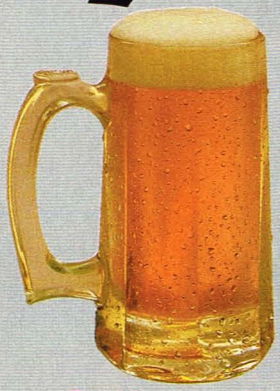
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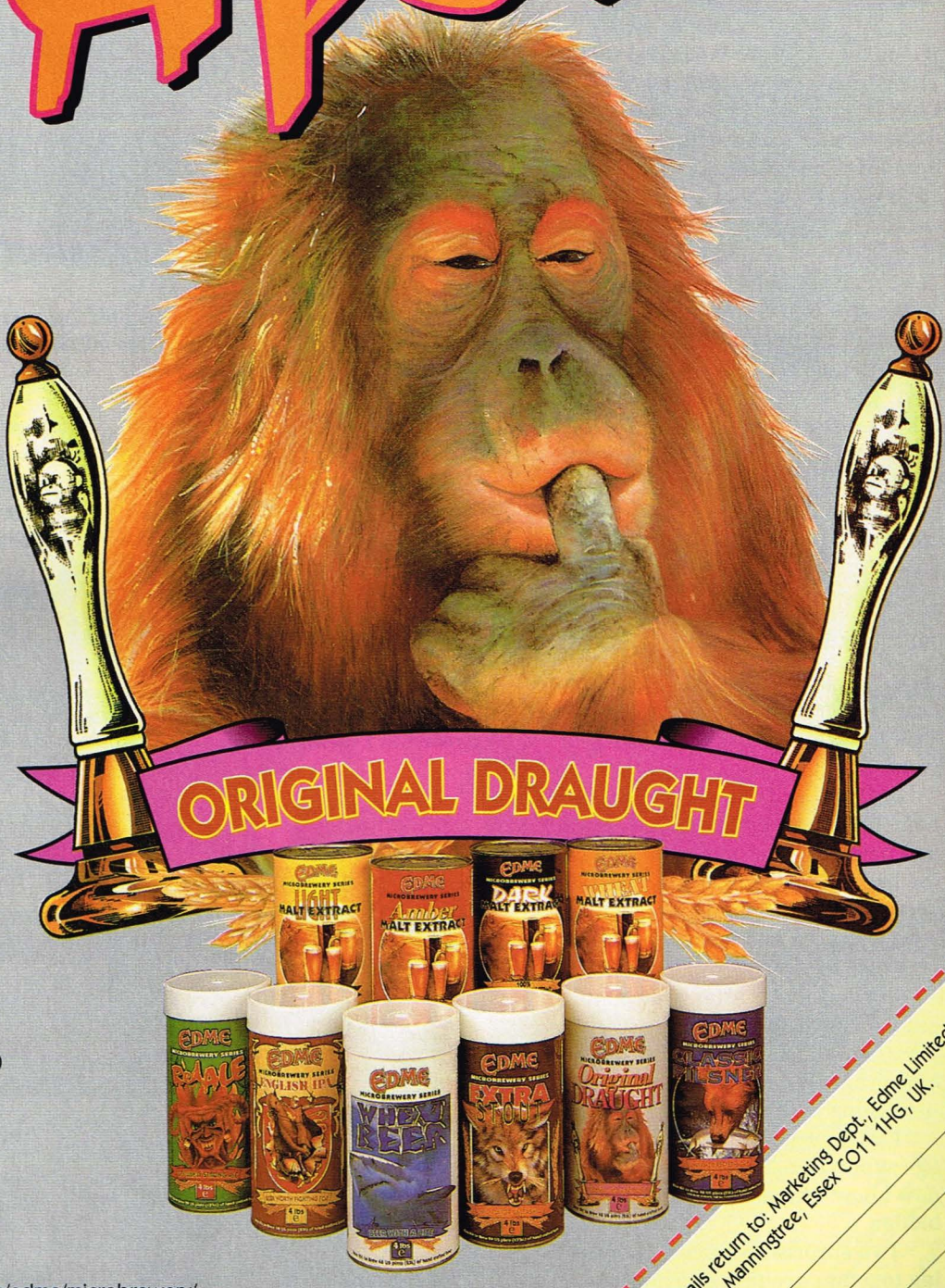
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CIRCLE 9 ON READER SERVICE CARD

Tom Krejci
Norfolk, Va.

Earlier this year my brother Andy called to tell me of his plans to visit at the end of May. His plans are usually just that, plans. I told him I had nothing going on, except that Sunday was brew day. Something in his voice told me that he was definitely going to make it this time.

He arrived Friday night and after catching up over a couple of my pale ales, we starting coming up with a recipe for our brew. We leafed through all of the BYO issues and the *New Complete Joy of Homebrewing*. We came up with a brown ale recipe with a little extra bitterness. The trip to the supply store was a success, filled with many questions from my bro.

Sunday came and we got an early start. He was given the task of boilover watcher. A half hour later the sound of wort hitting the hot stove told me that the watchman had fallen asleep at his post. Actually he got to looking at all the beer literature and the next thing he knew, whammo! "But it was all right a second ago!" he said. We cleaned up the tinfoil-covered stove and proceeded. The rest of the day went well, save the expected siphon beer squirt.

He left a couple of days later with some of my extra knick-knacks and began trying to locate his local home-brew supply store. I think we might now have a common hobby. I'll be sending him a few pints of "Boilover Brown Ale" in the mail very soon. Of course, he isn't here to help me bottle.



Brewing brothers Tom and Andy Krejci check on their wort. The majority of it went on to become Boilover Brown Ale.

Brothers Who Brew Together...

It is good to know that there is a real brotherhood among homebrewers. This is a brotherhood with some real potential.

My brother Doran and I have been homebrewing together for 1 1/2 years and have even more fun now than in the beginning. We have entered some very worthwhile competitions in the Memphis area and have won some very nice awards.

Doran is the master brewer, and I am the chief cook and bottle washer. We work well as a team. He enjoys the technical stuff, and I concentrate on the tasting and boiling.

Last year he promoted me to storage supervisor. This is good because I now know where the good stuff is hidden.

Two surprise benefits of our brewing together are that brewing is a very good way to maintain family ties and it offers my children an opportunity to see brothers who don't constantly disagree and not get along...if you know what I mean.

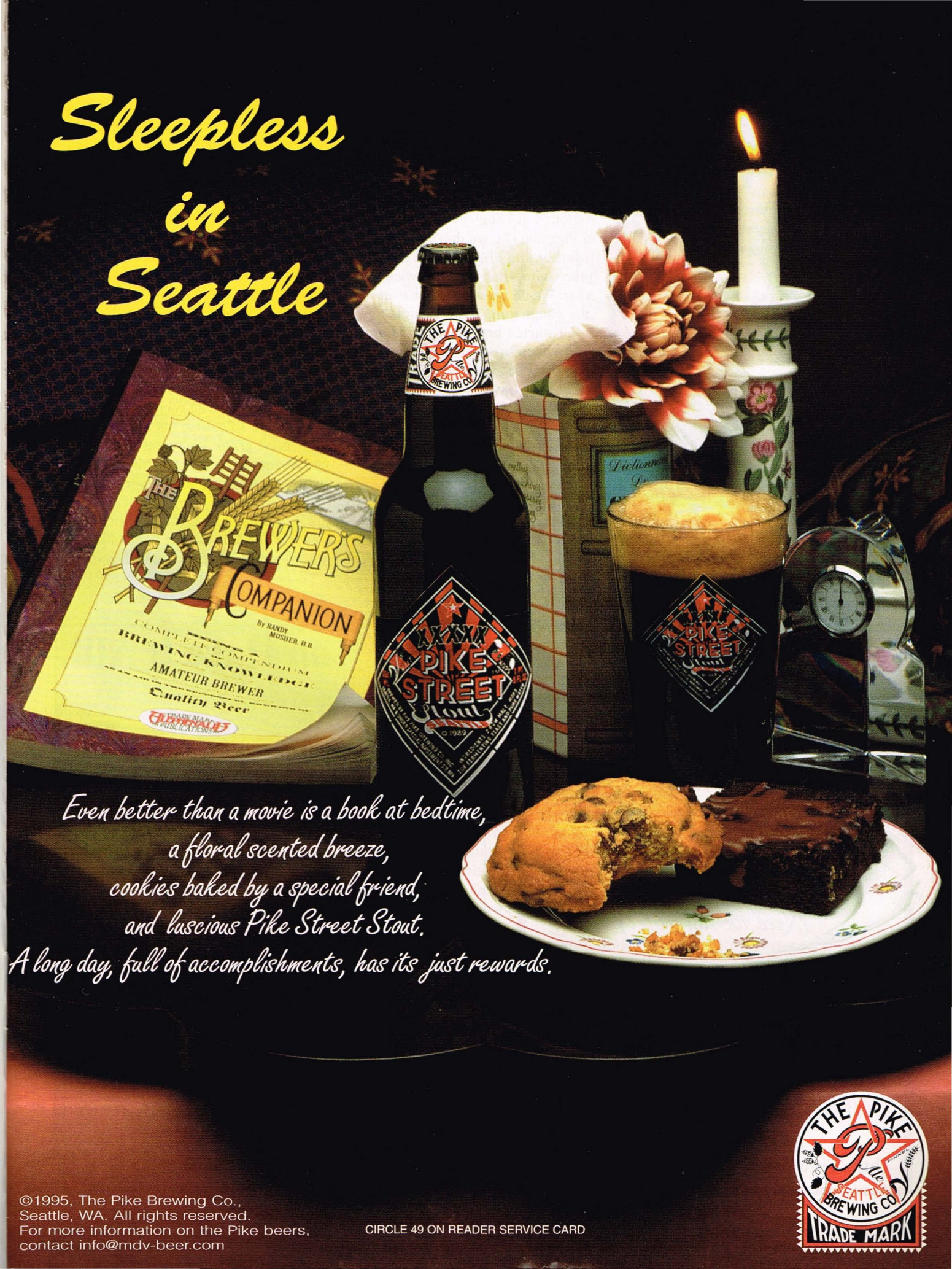
John Moranville
Memphis, Tenn.

Show Off That Special Something!

Tell us about your favorite piece of equipment...and send us a picture of it! There's a cool BYO t-shirt in it for you. Send your story to Pot Shots, c/o Brew Your Own, 216 F Street, Suite 160, Davis, CA 95616. Or send us e-mail at edit@byo.com. Be sure to include your mailing address!

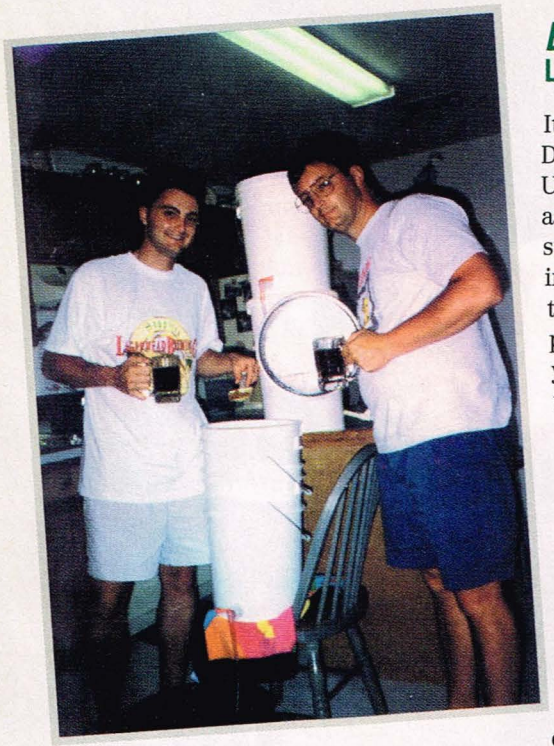
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CIRCLE 49 ON READER SERVICE CARD



Bill and Dave Bunning have to travel 600 miles to be together on brew day.

Bill Bunning
Langley AFB, Va.

It's hard to imagine that my brother Dave and I brew together. He's a US district attorney in Kentucky, and I'm a major in the Air Force stationed at Langley Air Force Base in Virginia. Oh, we don't get together and brew at each other's place more than once or twice a year. We do brew together over the phone quite a bit, though.

I started brewing in 1994 and have been brewing all-grain since my third batch. In September of that year Dave came and visited me in Florida and we brewed our first batch together (his first), a California common. He was hooked. Dave didn't want to get into all-grain right away, so I suggested starting out with extracts and specialty grains. Over the next several months we would phone each other just about every time we brewed.

That Christmas I visited him for the holidays, and we brewed up a batch of Papazian's Goat Scrotum Ale. Since we were at Dave's house, we were limited to extract brewing. I must say it was probably one of the finest beers we ever made.

Since then we have gotten together two more times and brewed Belgian ales — a dubbel partial-mash recipe at Dave's house and a saison at mine. He's "graduated" to partial-mash brewing and even cultures his own yeast.

We still get together on the phone every so often while we're brewing. Most of the time we just discuss procedures, things we could do better, and recipes. Our favorite recipe is a honey wheat beer. Of course his is extract and mine is all-grain! We're each brewing a commemorative beer for this summer's induction ceremony at Cooperstown. You see, our father and one of our best critics, Jim Bunning, is being inducted into the Baseball Hall of Fame. Mine will be appropriately named Tigers-Phils Classic American Pils.

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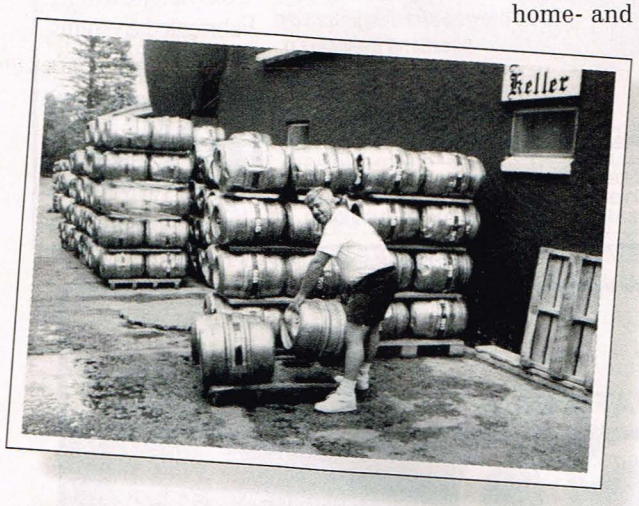


Travels With Larry

Dear BYO,

My friend Larry and I are both homebrewers. We live several hours apart. Every time we get together, we share a few of our latest homebrews. After I bottle my kriek lambic in about a month, my total volume produced will be 98 gallons of beer (and a little wine) since January of last year when I started.

When Larry and I got together this past May, we traveled to a couple of breweries. The first place we visited was Sherlock's Home in Minnetonka, Minn. It was all authentic, British-style everything. I think we were the least



Larry McCabe takes time out from his microbrewery road trip to go "keg-tipping" at the August Schell Brewery.

best-dressed people in the fancy brewpub. I tried their pheasant pie, which I must admit was very rich and tasty. I also tried their Queen Anne's Light Lager and Bishop's Bitter. Both were well to my liking.

Two days later we traveled to New Ulm, Minn., to visit the August Schell Brewery. It was located on a nice wooded hillside just outside the town. They have a beautiful garden outside, with peacocks roaming freely around old-style brick buildings. It was a very picturesque place.

The tour of the brewery was fun. We recognized all of the familiar smells from our homebrew kits back home. We tried six different beers in the tasting room: a lager, weizen, pilsner, alt, maibock, and a regular bock.

All good things must come to an end though, and I am now back at home, working every day. I'll definitely keep an eye out for breweries where ever I travel in the future.

Scott Wiberg
Roseau, Minn.

Give Me More Yeast!

Dear BYO,

Mr. Wizard (June '96 BYO) suggested that the great majority of home- and microbrewers are underpitching their yeast. I didn't know what to think, but after doing some tests, I am in complete agreement. My startup times were cut in half, and the vigor of the fermentation was noticeable after I increased my pitching rate.

Steve Darnell
Ypsilanti, Miss.

In Search of...

Dear BYO,

Has anyone come up with a recipe for Brooklyn Brewing Co.'s Chocolate Stout? It was a winner in some East Coast contests this past winter and even reached as far west as my "bockwoods PA" sophisticate bar. But I want to brew it!

Matt Clarke
Williamsport, Pa.

Lets Get It Started

Dear BYO,

My brother and I would like to start brewing on our own. We really don't know much at all about the whole process and materials. We would be very greatful for any information.

Bob and Roger Gaskins
Salem, Ohio

The best place to start is with a subscription to BYO and a visit to your local homebrew supply store. The friendly neighborhood shopkeeper can provide a wealth of information and advice. The store will also have a number of basic brewing texts that will help you with your first batch.

Make Mine Machine Made?

Dear BYO,

Do you know if there is a machine that one can use at home to make draft beer?

Sean Lee
Temple City, Calif.

"Draft beer" has two meanings: beer served from a keg, which is easily done at home using a five-gallon cornelius keg and a beer tap, and beer that has been sterile filtered. A sterile filter can be purchased at your local homebrew supply store.

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Je vais aller à Disneyland

by Scott Russell

I am a big fan of Belgian beers. This should not come as a surprise to anyone who has been reading this column for the past few months. Where else but in Belgium could you find such an assortment of unique, individualistic, and often off-the-wall brews? Many people refer to Belgium as the Disneyland of brewing. Absolutely.



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One of the Belgian styles that has particularly intrigued me for some time, in part because it is reputed to be so hard to duplicate, is the much-revered lambic, especially the fruited and/or spiced variety. It seems Belgian brewers are not afraid of anything. Leave your wort in open containers to cool in the night air? Sure, why not. They actually want that dose of bacteria to contaminate (excuse me, inoculate!) the beer — that's what makes it distinctive.

You want fruit in that beer? Okay. Cherries? Raspberries? Peaches? Currants? Too ordinary? Bananas? Yep. There's even a commercial Banana lambic.

Spices? How about cumin, curaçao orange, coriander, sweet gale, woodruff — if it's out there, it's in there.

A couple of autumns ago, I brewed up a batch of lambic, intending to make half of it into a kriek (cherry-flavored lambic). I also had some spare blueberries, so with a wicked grin I put about a gallon of them in a small jug of the beer. Well, I still had two gallons of "plain" lambic to do something with. Somewhere in my head a

Pomme Pseudo-lambic
(5 gallons, extract and grain)

Ingredients

- 0.5 lb. crystal malt, 20° Lovibond
- 0.5 lb. cracked wheat malt
- 5 lbs. weizen dry malt extract (approximately 50% wheat and 50% barley)
- 1 oz. Saaz hop pellets (for 45 min.)
- 10-14 grams of a dry ale yeast
- 4-5 lbs. chopped, fresh sour green apples.
- 1 packet Wyeast 3278
- 3/4 cup corn sugar (for priming)

Step by Step

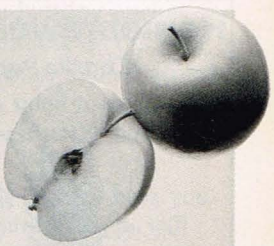
In 2.5 gals. of cold water, steep crystal and cracked wheat malt. Bring gradually up to 170° F and remove the grains. As liquor comes to a boil, remove briefly from the heat and stir in dry malt extract. Return to heat. When the wort begins to boil, add hop pellets and boil 45 minutes. Remove from heat, cool quickly, and add enough chilled, sterile water to make up 5 gals. in your fermenter. When cooled to 75° F, add dry ale yeast.

Ferment relatively warm (70° to 75° F) until the first phase of fermentation is done (three to five days, usually), then rack into a secondary in which you have already placed the chopped apples. Pitch prepared Wyeast 3278 (formerly labeled as Brettanomyces Bruxellensis, but now simply called B-yeast), close up, and condition cool (50° to 55° F) for 10 to 15 days.

Prime with corn sugar, bottle (carefully avoiding apple debris as you siphon), and age four to six weeks to allow the flavors to blend well.

Notes:

Don't be frightened off by this recipe. This is only an approximation of a lambic style, well within the abilities of the average homebrewer. For a more authentic lambic, which is difficult but usually worth it, please refer to Jean-Xavier Guinard's *Lambic*, volume three of the Brewers Publications Classic Beer Style Series.



Fruit: Obviously, apple is not the only fruit possibility here. Whatever you've got, try it. In combinations, too. If you have several one-gallon jugs, split a batch into five and try five different fruits, one pound of each.

Hops: Belgian brewers of lambics generally use hops only for their preservative value (and they often use stale, faded hops at that!). No real bitterness or aroma is needed here, although a mild flavoring hop is not out of place.

Yeast: Any good, dry ale yeast will do, as long as it is clean and reliable. Omission of the Brettanomyces will not ruin the beer, but it will not be as characteristically sour and "funky." I use the convenient Wyeast culture, but there are other lambic bacteria cultures on the market. Check with your supplier for his or her recommendation.

small voice said *pomme*. (One of my inner selves seems to always speak to me in French, especially when I am brewing Belgian styles.) Well, *pomme*, of course, is apple. And there on the counter, miraculously, appeared a bowl of fresh, sour green apples. Serendipity? Maybe. But "Pomme Pseudo-lambic" was born that afternoon.

Those two gallons were the ancestors, or at least the forerunners, of 20 more gallons over the last couple of years. The beer combines typical wheat tartness, the sweet/sour taste of wild yeast, and the sour tang of apple. Not entirely authentic, to be sure, either by process or by choice of fruit, but a reasonable and easy substitute.

I like to have a lot of this beer on hand for the end of September and beginning of October, when I am usually harvesting my hops and late vegetables. There can be very warm days in Vermont in the fall, and this is an extremely crisp, rich thirst quencher. Its sourness, like that of hard cider, cools off the thirstiest hop picker. It also pairs well with venison and other fresh game.

Reader Recipes

Bill Blunk's Fall Harvest Ale
(all-grain, 5 gallons)

"I made this beer after reading your article on using spices in brewing. It came out great the first time I tried it!"

Ingredients:

- 7 lbs. American 6-row pale malt
- 1 lb. roasted barley
- 2 lbs. wheat malt
- 2 lbs. crystal malt, 10° Lovibond
- 2 oz. Willamette hops (4.525% alpha acid) for 60 min.
- 1 oz. Mt. Hood hops (3.025% alpha acid) for 10 min.
- 1 tsp. Irish moss
- Black licorice
- 2 tbls. orange peel
- 2 sticks of cinnamon
- 2 tsp. nutmeg
- 6 whole cloves
- 1 tsp. allspice
- Wyeast 1007 German amber ale

Step by Step:

Use a simple infusion mash with barley and malts. Add 1.25 qts. water per pound of grain for conversion. Conversion should take 60 to 90 minutes. Sparge with 5 gals. 170° F water.

Add Willamette hops and boil wort 40 minutes. Add Irish moss and boil 10 more minutes. Add spices and orange in a hop bag and Mt. Hood hops and boil 10 more minutes. Add licorice to wort. Cool wort using wort chiller.

Pitch yeast in starter. Ferment for six days. Transfer to secondary and ferment for seven days. I force carbonated this beer. If you want to bottle, use two cups of corn sugar for bottling.

OG = 1.040
FG = 1.008 ■

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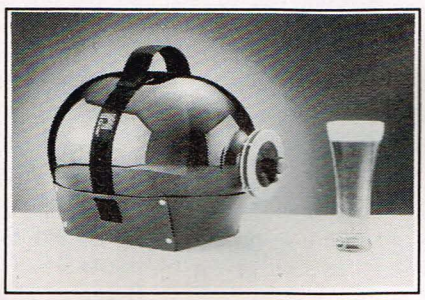
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A Primer on Secondary Fermentation

Mr. Wizard

What are your feelings on secondary fermentation for the home extract brewer? I have read many conflicting things as to the timing and benefits of this and would be most interested in your opinion.

When is the right time to do it? I'm too lazy to take specific gravity readings during fermentation. Should one wait until the beer clears? Is there any advantage to a secondary fermentation if the beer is to be bottled within 10 days to two weeks of pitching the yeast?

Mike Oberbeck
Westminster, Colo.



This isn't the first question to come across my desk about secondary fermentation. A common thread to many of these questions is some general confusion about what secondary fermentation is all about. The text book *Malting and Brewing Science* (Chapman and Hall) gives a clear definition of secondary fermentation, which I will paraphrase.

Traditionally, green or immature beer from primary fermentation is matured through a secondary fermentation. This process relies on a small amount of yeast that is brought with the beer into the secondary after racking from the primary. During secondary fermentation the yeast attacks one of four things: fermentable sugars remaining in the beer after primary fermentation, fermentable sugars added to the beer (priming sugars), added wort, or added actively fermenting wort (kraeusening). In commercial breweries much of the carbon dioxide produced during secondary fermentation dissolves in the beer because the fermenters are closed vessels, and the beer becomes carbonated as a result. During this process the occasional release of pressure allows some undesirable gases, such as air, hydrogen sulfide, esters, and diacetyl, to escape from the beer.

In the world of commercial brewing, this definition of secondary fermentation is universally accepted. Whether the brewery makes ales or lagers using grains or extracts, secondary fermentation is responsible for the natural carbonation and flavor maturation of beers.

Homebrewers interpret the term secondary fermentation a bit differently. Many homebrewers simply allow their beer to sit in a carboy for several days to several weeks following primary fermentation. Although this process is called secondary fermentation by many homebrewers, it doesn't really fit the definition because the beer doesn't become carbonated. What this practice does is allow flavor maturation and natural clarification, two important steps in making good beer. This type of process typically concludes by bottling the beer with some priming sugar to allow for carbonation; this is the real secondary fermentation.

To answer your question about what I would recommend, I give the following tips for brewing ales (lagers require the same steps but the time taken to accomplish each step must be extended).

Tip one is to allow your beer to sit in the carboy at least one day at fermentation temperatures after the specific gravity has stopped dropping or the beer begins to clarify at the top of the carboy. These are both signs that primary fermentation is complete. A one- to two-day hold at fermentation temperature allows for the reduction of certain undesirable flavor compounds associated with green beer, namely the buttery-smelling diacetyl. At this point some like to rack the beer into another carboy. If you feel comfortable with this practice, go ahead and do it since racking at this stage will get the beer off most of the yeast and trub.

Tip two is to allow the carboy to sit undisturbed for at least five days to allow most of the yeast still in the beer to settle out. This process is best accomplished if the beer is kept cold, but not all homebrewers have the ability to keep five gallons of beer cold for this long. After this stage is over, rack the beer into a bottling bucket or cornelius keg. Depending on the type of carbonation you plan to do (natural or forced), you may need to add a small amount of yeast to the beer at this stage.

Regardless of the type of beer you are brewing, these simple steps will allow some flavor maturation and clarification before bottling. These two things are positive. Regarding true secondary fermentation, however, most homebrewers really only perform that once the beer is primed and bottled.

Mr. Wizard

I've been reading and hearing reports lately regarding health and drinking that seem contradictory. Dark beers and red wines have been touted for their ability to reduce the risk of heart disease, whereas the excess girth associated with alcohol consumption has been linked to an increase in heart disease. How can Guinness be good for you if bulging bellies are bad?

Gregory Lewis
Christiansburg, Va.

I've been waiting a long time to open my mouth regarding beer and health, and now I have an excuse. If you're reading this column over a bowl of Cheerios and a liter mug of hefe-weizen and are sporting one of those awful t-shirts proclaiming "Beer, it's not just for breakfast anymore," please read on!

The topic of alcohol and health is like most other health issues in that there is no single clear answer. Heavy drinking has long been associated with liver disease, not to forget alcoholism. Clearly two negatives.

However, recent data from epidemiological studies and laboratory experiments indicate that moderate drinking decreases the incidence of heart disease. These studies suggest that all alcoholic beverages — beer, wine, and spirits — when consumed in moderation (one or two drinks per day) have similar effects. In essence all ethanol is created equal, which certainly makes sense to me considering my body doesn't know a molecule of ethanol sipped from a wine glass from a molecule of ethanol slurped from a beer mug.

In addition to ethanol, some alcoholic beverages contain other substances that appear to be good for you. These compounds fall into a broad category of pigments called flavanoids. Flavanoid pigments belong to an even larger group of compounds known as antioxidants. In recent years the dietary consumption of antioxidants, such as vitamin E, has been encouraged because of their apparent ability to reduce free-radical tissue damage, which is thought to reduce the risk of certain cancers.

The flavanoids found in red wine and dark beers, although not yet shown to ward off cancer, may reduce the risk of heart disease, especially for those individuals who already have coronary heart disease. This effect, demonstrated in laboratory dogs, is apparently due to a reduction in arterial clogs caused by aggregates of blood platelets.

To brew up a batch of arterial delight red ale, a healthy dose of crystal malt and a pinch of roasted malt will give your brew a nice complement of flavanoids. Of course any brown or black beer, be it stout, porter, or doppelbock, will contain plenty of antioxidants.

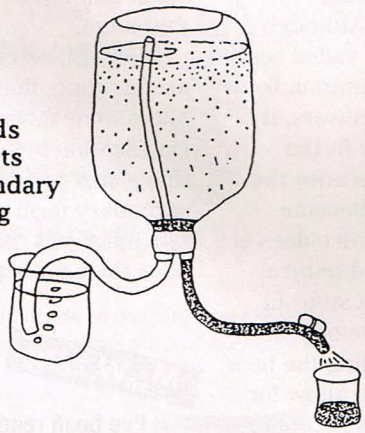
To briefly digress, the presence of antioxidants in beer is important for another very critical reason: fresh beer. Since stale beer is largely caused by oxidation of flavor compounds, the presence of malt-derived antioxidants makes darker beers more stable than their lighter counterparts. If you ever have wondered why Corona Dark tastes fresher than regular Corona, now you know. Oops, Corona Dark doesn't exist. Anyhow, you get the idea.

For those of you who don't drink dark beers or for those who want to help a non-dark-beer-drinking friend, there is hope. Red wine, grape juice (wine in waiting), and tea will all provide antioxidant flavanoids similar to a

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pint of Guinness. In all cases about two servings a day will do the trick. If you are a coffee hound, as am I, don't get too excited since these same canine studies suggest that coffee aggravates platelet clogs.

For those health-conscious readers who are already on their fourth stout attempting to clean out those arteries, slow down! A third health factor to consider is your "waist-to-hip" ratio. Unlike the liquor-to-grist ratio familiar to all-grain brewers, a waist-to-hip ratio of three is bad, real bad. Although scientists haven't found the exact point where beer bellies become dangerous, it has been established that large waist-to-hip ratios correlate with an increased risk of heart disease.

Recent epidemiological research from Bruce Duncan's group at the University of North Carolina shows that people who consume more than six drinks per week fall into three categories. The first consists of the beer drinkers with the largest average waist-to-hip ratio, then come the spirits drinkers with waist-to-hip ratios larger than non-drinkers but smaller than beer drinkers, then come the wine drinkers who have waist-to-hip ratios smaller than non-drinkers.

The unanswered question is whether these differences are due to the drinks themselves or the diets of people who consume beer, spirits, and wine. In other words, is a beer belly really a beer belly, or is it a hamburger-french fry-banana split with extra whipped cream belly? For the health of all beer drinkers, I hope the latter is the correct answer because I would rather be a healthy beer drinker on a diet than a hopelessly chubby beer drinker on a diet!

I have my own ideas on alcohol consumption not addressed in any of these studies. My idea is something like this. There are stressed out, anal retentive teetotalers who go through life infrequently cracking a smile. These folks end up with ulcers or heart problems at an early age. The other type of folk take time out of their busy lives to kick back and have a drink.

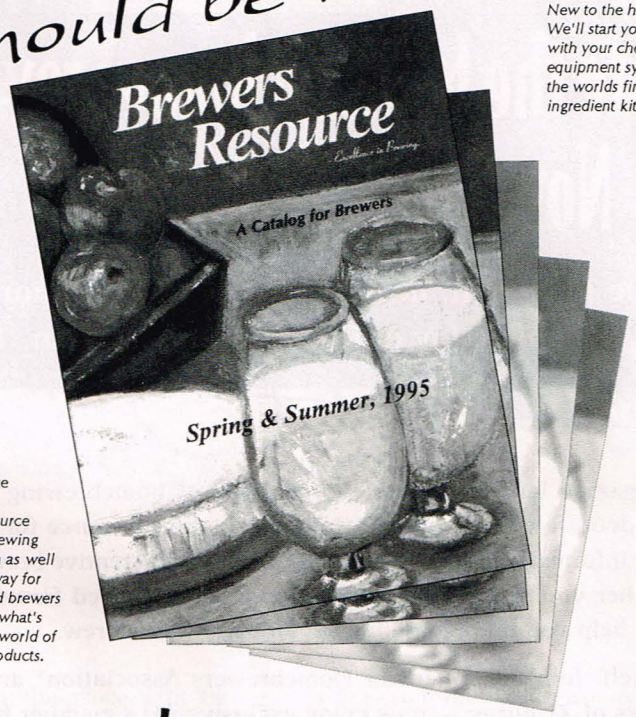
Beer drinkers eat sausages, French fries, or potato chips during their therapeutic socialization. Most social beer drinkers can make two beers last a good 90 minutes given enough food.

Cocktail drinkers eat cocktail weenies, small chunks of cheese, and the occasional fruit or vegetable garnish floating in their tumbler while hanging out with their after-work crowd of friends. Depending on the person, two cocktails can be thrown back pretty quickly with just a few bites of food in between.

Wine drinkers, on the other hand, nibble on crackers, very thin slices of cheese, and petitely cut vegetable and fruit sticks following their evening session of aerobics. After all, so much swirling and sniffing has got to burn a hell of a lot of calories as well as make it difficult to snack. A serious social wine drinker can stretch two glasses of vino out over two hours, easily. Think about it, two hours of jaw flapping and intense breathing every

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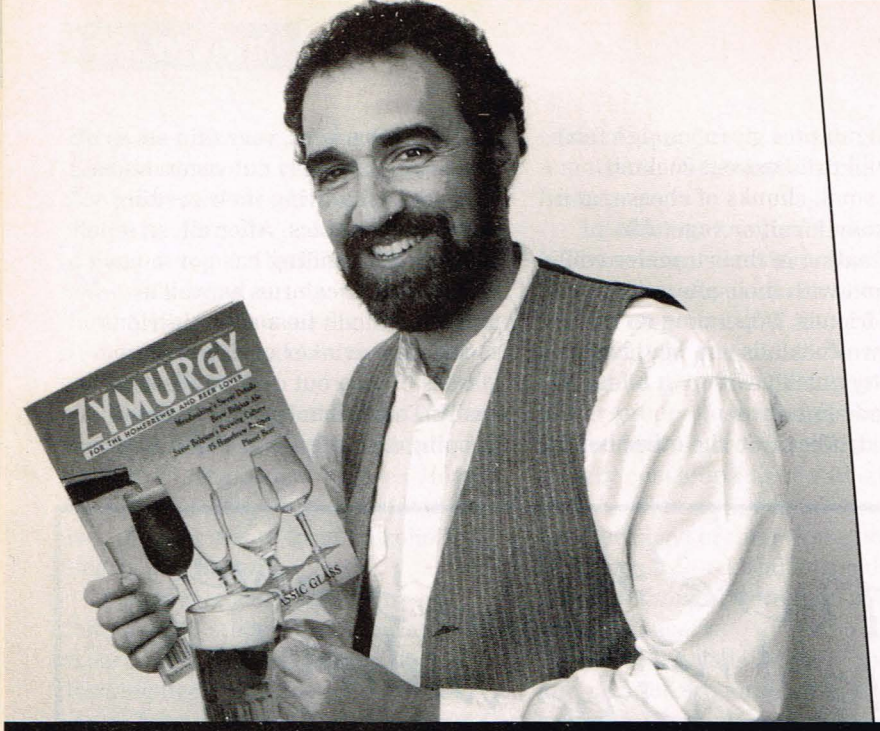
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Mr. Wizard

day. No wonder they have trim waistlines.

So there you have it, chubby beer drinkers, slightly larger than average cocktailers, and thin wine drinkers. It may be crazy, but it's an idea.

Mr. Wizard

Here is yet another length-of-boil question. When extract brewing, does the length of boil affect the color of my brew? If so, does it matter if I reduce the length of boil to 15 minutes from 45, hence getting a lighter-colored brew?

Angel Ilarazza
Bowling Green, Ohio

Length of boil affects wort color in all types of brewing. In extract brewing the effect is sometimes even more pronounced due to the practice of boiling a small volume of high-density wort and diluting it up to five gallons after the boil. This causes more wort darkening, since the components that react to form colored compounds are more concentrated in this method of boiling and the reaction leading to color proceeds at a faster rate when the reactants are concentrated.

Reducing the boil to 15 minutes is okay if you are using pre-hopped extracts. However, I would not boil for much less than 15 minutes, because the wort may not get completely sterilized with a shorter boil. This rule does not apply if you are adding bittering hops to an unhopped, extract-based wort. For these brews a full 60-minute boil is needed to gain the full complement of hop acids needed for bittering. ■

Mr. Wizard's Address

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

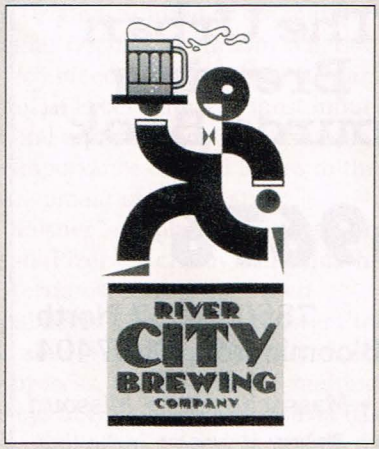
After the failure of his only album, "Sergeant Wizard," Mr. Wizard abandoned the music business in favor of the less-stressful life of a brewing idol.

When Time is of the Essence

by Gailen Jacobs

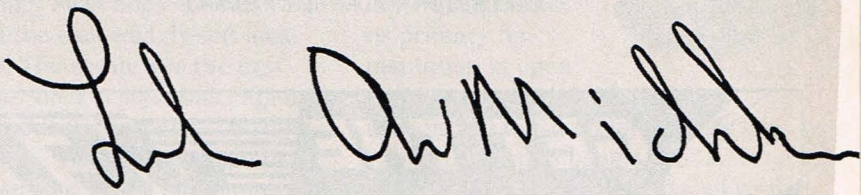
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Usually a microbrewery can serve an ale 10 to 14 days after brewing. A lager will take about 21 to 28 days. Homebrewers have a long ferment (two weeks) and then an extended bottle-conditioning time (one month). It can take a homebrewer four to six weeks before his beer is ready to drink.

To speed up the process, homebrewers need to make sure they have a nice, healthy pitching yeast. If you use a liquid yeast pack or something like that, you need to do another propagation into 250 milliliters of sterile wort. This gets the yeast going before you pitch it into your five gallons. If you get a nice, healthy yeast to start with, you can avoid those lingering fermentations.

Start your smack pack and let it grow its normal two days, then get your starter going with your sterile wort in a flask. That will get cooking in a day or so. That's about the right amount of yeast to pitch into five gallons. The yeast will have gone through a five- to tenfold increase in volume. You can start your yeast starter a few days ahead of time.

When you pitch enough active yeast, you can see fermentation start within 12 hours. If you hold the temperature at the right level for your yeast, your fermentation should be done in five to seven days. While raising the temperature will speed up fermentation, it will also give your beer fruity off-flavors and raise the alcohol higher than you'd like.

Lager beer fermentations take a little longer.

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The Tips

If you are tight on time:

- Brew ales instead of lagers. The lagering process is inherently time consuming.
- Brew dark ales instead of light ales. Dark ales hide young-beer flavors.
- Pitching enough active yeast can save you one week in fermentation time.
- Switching from bottles to kegs (and filtration) can save you up to one month in conditioning time.

rack it, filter it, keg it, and force carbonate it. With the rapid fermentation and kegging with forced carbonation, you can have your beer turned around as fast as a microbrewery.

If you really want to keep your beer in bottles, it will take its time. After you bottle you don't want to keep the beer too cold. It should stay around 60° F or so, until the conditioning takes place. Too-cold temperatures will slow down that secondary fermentation. That yeast also needs to settle back out — that will take some time, too. Conditioning is pretty much a three-week process. If you want really clear beer, you will have to let it age a little bit longer than that.

Many homebrewers will rack the beer to a secondary fermenter and let it ferment out until the CO_2 really slows down or when their gravity measures where they want it. Even if you're in a hurry, you don't want to bottle fermenting beer too soon because you can end up blowing the bottles up.

To speed up bottling, you can filter and counter-pressure fill a keg, and then do a counter-pressure fill on the bottles. That way you could have that beer as soon as you could have the other carbonated beer in the keg.

If you do have a very limited time, darker ales tend to hide more off- and green-beer (young beer) flavors than lighter ales or lager, so dark ales are usually a beer that you can make pretty fast. The less roast malt or specialty grain character the beer has, the longer it will take the beer to mellow, to age. ■

Brew Traditional European Pilsner

by Jeff Frane



In 1922 American journalist and writer H. L. Mencken was touring Europe. Twenty years later he wrote, "Torovsky and I actually started on a pilgrimage to Pilsen, the home of the best beer in the earth and hence one of the great shrines of the human race. There, Torovsky did some more whispering, and we were invited to visit the principal brewery as the guests of the management. Deep down in the earth, in a cellar both dark and cold, we were served some Pilsner beer that I recall with a glow to this day."

The brewery Mencken visited was Plzensky Prazdroj, or Pilsner Urquell (the Original Source) in the more familiar German rendition. Whether PU is, indeed, the "best beer on earth" or not, it is certainly the most influential and a particularly fine example of the importance of local forces in the development of a beer style.

"Pilsner" simply means a beer from Pilsen (Plzen), a city in Bohemia, the westernmost half of the Czech Republic. In 1842 a new brewery there was able to bring together a new malting process, the exceptional malting barleys of Bohemia and Moravia (the other half of the Czech Republic), the extraordinary Saaz hops of nearby Zatec, and the exceedingly soft local well water. The result was the first golden lager beer, a style that rapidly gained popularity throughout Europe. Beer drinkers were beginning to use glass rather than metal or stoneware for their beer mugs, and the beer's popularity was enhanced because it was pale and clear, unlike most beers. By the end of the century, PU was the largest brewery in Europe.

Today, some form of "Pilsner" is brewed in virtually every brewing nation, but the finest is still the original, virtually unchanged over 150 years. Pilsner Urquell is a deep gold, perhaps warmer in color than many imitators, with a dense white head. The beer is crystal clear, and the intense bitterness is balanced by a full-bodied maltiness. The aroma is a fabulous blend of malt and the wonderful Saaz hops, and the promise of the nose is fulfilled in the mouth. Truly an incredible beer.

The fine Moravian and Bohemian barleys are malted by traditional methods. They are then mashed in a complex and lengthy triple decoction process, during which portions of the grist are boiled, then returned to the whole. The wort is boiled for one hour longer than the usual 90 minutes, with three additions of Saaz hops, to an original gravity of 12° Plato (1.048).

Unusually for a lager beer, PU has its primary fermentation in open wooden vessels (40° F), then is transferred to closed fermenters for two to three months near 33° F.

The beer has never traveled well (and perhaps soon the brewery will at least send us the beer in brown bottles rather than the green "Please, skunk me" bottles we now get), but occasional glimpses may be had here in North America in particularly well-treated samples. Of late we can find PU on draught — which is definitely worth seeking out.

The only other "true" pilsner is Gambrinus (now owned by PU), but I have never seen it in the US. Equally fine in many ways is another Bohemian beer from Ceske Budejovice (Budweis), slightly sweeter than PU but otherwise very similar; unfortunately, the beer's name, Budweiser Budvar, has obvious trademark problems in this country.

West of Bohemia, pilsners have proven remarkably successful in

Pilsner U-Betcha

(5 gallons)

Ingredients:

- 8 lbs. Belgian pilsner malt
- 0.5 lb. Belgian aromatic malt
- 0.5 lb. Belgian cara-pils malt
- 3.5 oz. Saaz hops (3.1% alpha acid)
- Brewers Resource Czech lager yeast

OG=1.052; TG=1.012

Step-By-Step:

Mash in at 125° F for 15 minutes and raise to 154° F for 60 minutes. Sparge to 6.5 gals. and boil. Add 2.25 oz. hops and boil 45 minutes. Add 0.75 oz. hops and boil 25 minutes more. Add 0.5 oz. hops and boil 5 minutes more. Cool to pitching temperature and add 2 qt. starter of yeast. Ferment at 48° F for about two weeks, or until specific gravity is 1.020; lager for two months at 35° F.

— Martin Wilde, Portland, Ore.

Germany, particularly in the north. Here, the beers tend to be somewhat more pale than the original and often much drier and more bitter. Pilsners (also known as pils) have, in fact, become Germany's most popular style and are produced by virtually every brewery. While some of the beers are very good, many are unremarkable, a state that seems to degenerate the farther the brewery is from the source — by the time they've crossed an ocean, the resemblance is pale indeed.

German pilsners are, predictably, hopped with German varieties such as Hallertauer and Tettnanger rather than Czech. Some are brewed as a slightly lower gravity (1.042 to 1.047) and tend to be much more crisp and dry, so the perception is that they are more bitter.

An exceptional bitter and dry pilsner is brewed by Holland's Christoffel microbrewery and is available here. A few good craft-brewery versions have appeared in the US. A personal favorite is Gartenbrau Special from Wisconsin's Capital Brewery, and I have tasted fine pilsners from Stoudt (Pennsylvania), Full Sail (Oregon), August Schell (Minnesota) and, oddly, one contract brewed for Jack Daniels.

Much of what is done by the PU brewery to create its classic can be emulated at home, but this is not a beer that lends itself to shortcuts.

While homebrewers may not have access to the same malts used in Pilsen, it is possible to locate high-quality two-row lager malts. German and Belgian pilsner malts are particularly fine, but successful beers can be brewed from the best North American malts (I've been particularly impressed with those from Great Western, Gambrinus, and Schreier). The complex triple decoction mash can be simplified (see "Pilsner Decoctions" box at right) or even eliminated, but in the latter case some caramel malt, honey malt, or aromatic malt is useful to replace the flavors and color generated when portions of the grist are boiled. German-style pilsners can be brewed from decoction or step-infusion mashes and mashed at temperatures designed to produce a drier beer.

Saaz hops (loose or pellets) are readily available, although expensive. A little creative fudging might be in order, using a higher-alpha hop such as Northern Brewer for early bittering additions, reserving the Saaz hops for middle and late additions. Pilsner Urquell is never dry hopped, but the practice has become more common among hop-crazed homebrewers.

German-style pils, as mentioned, can be hopped with German hops. Northern Brewer or Perle are definitely in order for bittering here, along with late additions of American clones such as Mt. Hood, Liberty, or Crystal. The bittering can be very aggressive in these beers, with an aim toward a crisp, dry finish and a delicate, flowery nose.

There are various sources for good pilsner yeasts. Some reporters have claimed that the brewery uses a mixed strain, while others maintain this is merely a melange of mutations of the same strain. Whatever the truth, the pure single strains available seem to function very well. The adventurous may try open fermentation, although few of us have the "correct" wooden vessels. Again, the German strains will be different, calling for highly attenuative varieties. Wyeast 2007 is a good example.

For the malt and hops to predominate, fermentation temperatures must be kept low, and a real pilsner needs real lagering. Which means, for those of us not fortunate enough to own ice caves, some kind of refrigeration. While they undoubtedly exist somewhere, homebrewers patient enough to lager their beers for three months are mighty rare — six weeks seems to work very well.

Lager beers are enough, in my mind, to justify a kegging system. The usual homebrewer's method of bottle conditioning to achieve carbonation is tough to adapt to lager beers, where

Pilsner Decoctions

Hochkurzmaischverfahren (high temperature, short-mashing) Decoction

One modification of the double decoction was developed by the Germans for pale lagers and works pretty well for pilsners. Its great advantage is that it is simpler, and considerably shorter, than the original Pilsen method. Well-modified malts are essential, since the process lacks the normal protein rest.

Mash in with about 1.25 quarts of soft water per pound of grain at 145° F. Take one-fourth of the grain and transfer to a kettle, raise it quickly to the boil, and then return to the main mash; this should raise the temperature of the total to about 158° F. When saccharification is complete (about 60 minutes), a second decoction is taken (also about one-fourth) and boiled, then returned to the main mash. At this point the temperature should be about 165° to 168° F for mash-out.

The last stage can be left out altogether (making it a single-decoction mash) by raising the temperature of the original mash by direct heat.

Original Pilsner Triple Decoction Mash

Mash in at 95° F and thoroughly moisten grain. Transfer one-third of the thickest portion of the mash to a kettle and raise the decoction to 144.5° F over 13 minutes. Over 20 minutes raise the temperature to 167° F and hold for eight minutes. Raise to boiling in 12 minutes, boil for 30 minutes, and return to the main mash — this should bring the mash to 110.5° F

Pull a second decoction and transfer to kettle. Raise to 167° F, hold briefly, then raise rapidly to the boil. Boil for 15 minutes and return to the main mash, which should then be at 144.5° F.

Pull the third decoction and raise to boil in 12 minutes. Boil for 10 minutes and return to main mash, which should now be at 162.5° F. Mash out.

From H. Lloyd Hind, Brewing: Science & Practice, Vol. II, *John Wiley & Sons, Inc., 1938.*

the yeast has had long weeks to settle out of the beer. Fresh yeast can be added, along with priming sugars, at bottling. Bottle-conditioned lagers seem a touch strange, but Christoffel is one commercial beer produced just this way. Years ago, author Fred Eckhardt outlined a method for bottling lager beers that called for normal bottle conditioning and then followed a procedure used for champagne bottles in which the bottles were inverted for several days. When all the yeast has settled in the neck near the cap, the bottle is aggressively chilled (virtually frozen) and the cap quickly removed. The yeast plug is sluggishly pushed out the neck and the bottle quickly recapped. There are also plenty of counter-pressure bottle fillers available these days so that bright beer can be bottled directly from kegs (particularly useful in impressing competition judges with your crystal-clear pilsner).

Exceptionally good homebrewed versions should, of course, be sent to BYO's beer styles columnist for approval. The best version will be saved by our select panel of judges — Jeff and Elizabeth. You won't get a medal, mind you, but you will be appreciated. ■

PU for You

(5 gallons)

Ingredients:

- 4 lbs. Alexander's pale malt syrup
- 2 lbs. Laaglander extra light DME
- 0.5 lb. Gambrinus honey malt
- 0.5 lb. Belgian cara-pils malt
- 2 lbs. 2-row lager malt
- 4.5 oz. Saaz hops (3 to 3.5% alpha acid)
- Pilsner yeast

OG=1.050; TG=1.010

Step by Step:

Steep the crushed malts in 1 gal. water at 150° F for 60 to 90 minutes, then sparge into kettle. Add malt extracts and boil as much wort as the kettle will safely hold (2.5 to 3 gals.). Boil for 15 minutes, add 3 oz. hops, and boil 45 minutes more. Add 1.5 oz. hops and boil 30 minutes more. Cool and add to pre-boiled water to bring volume to 5 gals., aerate thoroughly, and pitch 2 qt. pilsner yeast starter when wort has lowered to 65° F. Allow wort to cool to 50° F and ferment for two weeks, or whenever specific gravity equals 1.020. Rack to secondary and lager for 60 to 120 days at 33° to 35° F. Keg or bottle as described in the text and hold for two months at 35° F.

— Martin Wilde, Portland, Ore.



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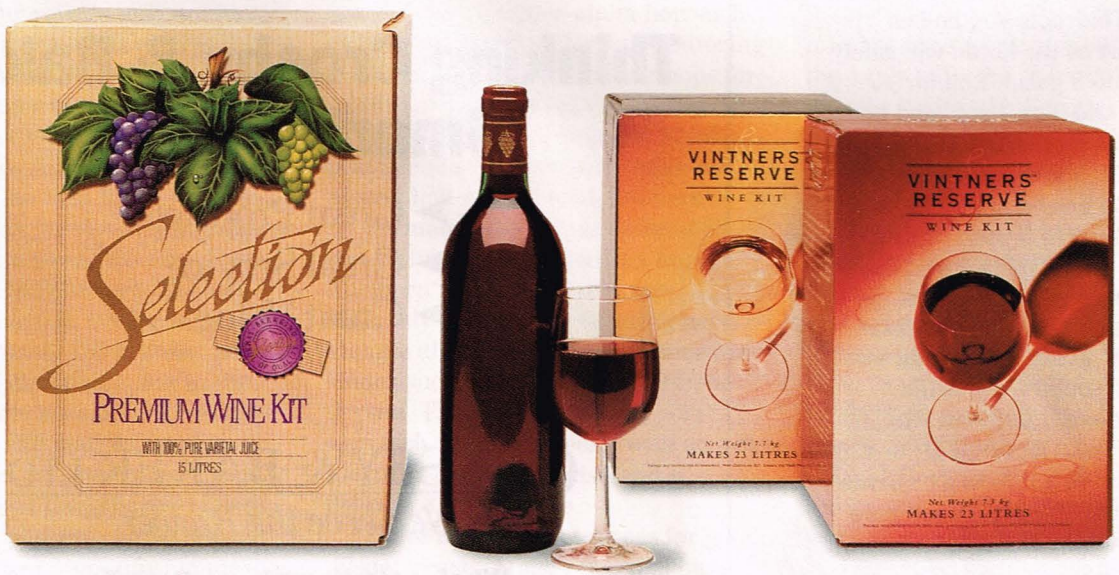
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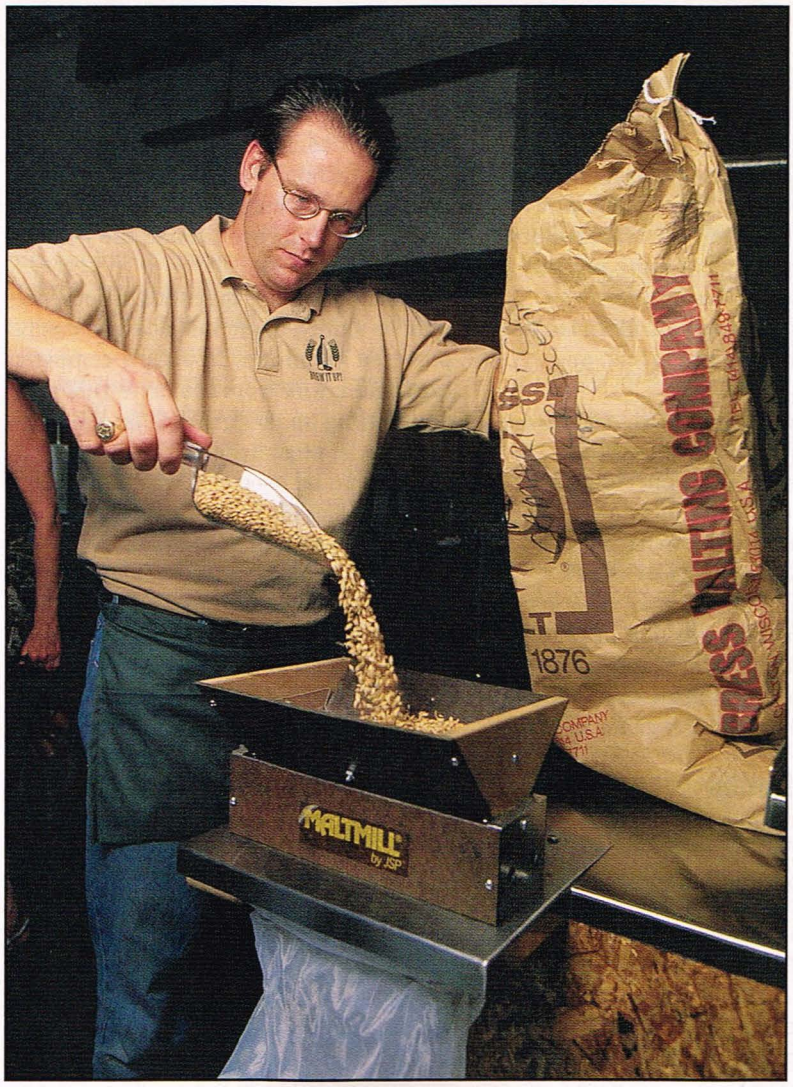
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TODD HAMMOND PHOTOS

MILL YOUR OWN GRAIN

by Kirk Fleming

Whether you're all-grain or partial mash brewing or just steeping specialty grains, you'll find that selecting, milling, and using grain has its rewards. Here are some things you should know about milling grain.

What the Mill Does

For an efficient mash the grain must be physically crushed and broken apart. The resulting ground meal is called grist. It might seem as if the finer the grist the better, but when the mash is complete the grain has to be separated from the mash liquid. If the grain were ground to flour, separation would be difficult because nothing would flow through the grain bed.

The ideal grain mill breaks the grain into enough pieces so all the contents of every seed can be extracted and converted into simpler compounds during mashing. It leaves the husks as unbroken as possible. If the husks are left intact, they help keep the ground meal, or endosperm, separated enough to allow flow through the grain bed. The idea is to literally squeeze the malt until it's crushed inside the husk, not to roll it like wheat in a bakery grist mill.

If you're doing a partial mash of a pound or two of grain so that it's fairly easy to separate the mash liquid from the grain using a grain (straining) bag, or if you're just planning to steep specialty grains to add color, flavor, and aroma to an extract brew, the way the grain is milled isn't too important. A good crush becomes a factor when brewing all-grain, where 10 pounds of grain can become a real mess if you can't get the mash to flow through it.

Some commercial breweries add rice hulls or oat husks to the mash to help keep the grain bed light and fluffy, especially when using huskless wheat malt. For the average-gravity, five-gallon batch of all-grain beer, almost any crush will work just fine if the grain hasn't been reduced to flour.

How Mills Work

Huge industrial malt mills have evolved to give a balance between the cost of mill operation and maintenance and the efficiency of the brewing process that results from the mill's use. The main feature shared by almost all mills, whether designed for use by

Anheuser-Busch or by you at home, is the use of pairs of parallel metal rollers.

Whether the rollers are a foot in diameter and four feet long or an inch in diameter and six inches long, the idea is basically the same. The rollers are held parallel in a frame, with a spacing between them that is small enough so no grain can pass between the rollers uncrushed.

Industrial mills may use two or three pairs of smooth rollers, each pair spaced differently for each stage of the milling process. Such mills also use screens, conveyors, scrapers, and other design features to separate coarse grist from flour and all grist from the husks.

As you'd expect, the industrial brewing giants have to get the most from their malt. Pennies count when you're making 50 barrels of beer a minute, and big mill designs make economy and throughput top priorities.

A Mill for You

Of course, you and your local supply shop would like a mill costing less than a Malibu beach house. Over the years several manufacturers have built a variety of mills using the two-roller concept. One mill used a single roller held close to a flat, fixed plate, and another popular mill uses two rollers that are purposely not quite parallel.

Other differences between the various designs include roller size and materials, bearing materials, and grain-hopper size.

Mills priced in the $70 to $160 range are available from several manufacturers. When purchasing a mill, you should look for one that will treat the grain gently. When the rollers of the professional-size mills are reduced to homebrew size, they lose some of their ability to pull in grain smoothly and crush grain in stages. Watch out for homebrew mills that automatically grind the grain too fine.

Mill Motorization

The first thing that comes to mind after milling 15 pounds of grain using any hand-operated mill is, "Let's motorize it."

Although few manufacturers will actually recommend motorizing their mills, you should ask them if they feel their products can be safely motorized and if they will recommend the best way to do it.

The next thing that should come to mind is safety. Some mills can be easily powered in minutes by simply removing the hand crank from the drive roller and putting an electric drill on the drive roller axle. Most drills with 3/8-inch chucks can be used this way, but there are a few details to think about to avoid damaging the mill or yourself.

First, malt contains some debris. Grain that's been swept up off the floor can contain small stones, for example, and these can get into your mill. When they do, they get crushed, something breaks, or the mill stops cold. In industrial equipment where heavy rotating components such as flywheels are mounted on shafts, the two are often keyed together with a soft metal pin. If something causes the shaft to lock up, the flywheel shears the pin and continues to turn rather than breaking the shaft.

You can mimic the shear pin by wrapping a strip of plain paper over the shaft of the drive roller, then putting the wrapped shaft in the drill chuck. Tighten the chuck by hand (not by wrench) just enough to turn the mill when fully loaded. If anything locks up the mill, the drill chuck will slip on the roller shaft.

Also, be aware of the huge difference in the available torque of various electric drills. Some expensive industrial drills produce enough torque to seriously hurt you if something brings them to a sudden stop.

When adding motors, power tools, and electricity to the brewing process, you need to think safety for yourself and others. An electric drill left plugged in and lying on the floor may be a minor threat to young children; a motorized grain mill left plugged in and mounted at bucket height may be a serious hazard. Think about what you're doing and about what happens when fingers or clothing get caught in gear-driven machinery. Because brewing usually means water, pay careful attention when using a motorized mill.

The History of Cider 101 Professor Marmota Monax

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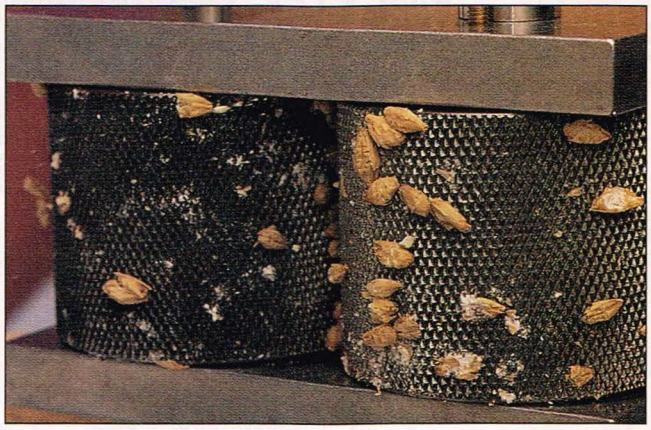
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When grain is milled in bulk using a powered mill, a tremendous amount of grain dust can be generated. Besides the risk of contamination of your beer caused by uncontrolled dust, a cloud of dust in the air can be a serious explosion hazard. Try to ventilate the milling area if you're generating a good deal of dust, and avoid flames or sparks. This may not be a real problem for the average amateur brewer, but don't take chances.

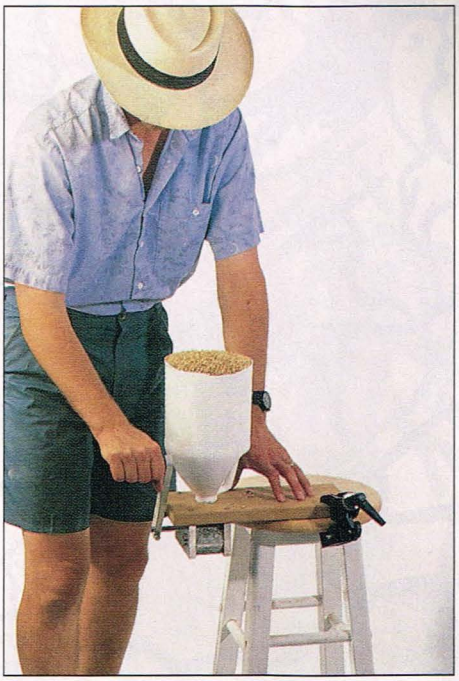


A mill's parallel rollers squeeze the grain, separating the husks from the inside of the seeds without grinding the grain to a powder.

Milling the Grain

If your supply shop already has a mill set up for customer use, then you're a very lucky brewer. Some stores have poorly mounted Corona mills that may be worn and difficult to handle or inconveniently located in high-traffic areas. Other stores may have permanently mounted, motorized roller mills set up directly under the grain scales. Either way, you'll have to decide whether you want to use the set-up at the store or buy a mill for yourself at home.

To get the most from any mill, mount it in a convenient location. Some mills are designed to be clamped to a workbench, and others are made to sit on top of a five-gallon plastic bucket. In either case a sturdy set-up that allows one-handed operation of the mill is ideal. Workbenches and tables can be modified easily to both support the mill and to allow the grist to fall directly into a receiving bucket underneath.



If you own a mill at home, you can buy grain in bulk for several batches, crushing enough for one batch at a time.

An important point to always remember: Mill your grain in a location as far as possible from where you'll be chilling your wort and fermenting it. Grain dust is rich in bacteria — bacteria that can contaminate beer quite easily.

You may have noticed in brewpubs and microbreweries that the grain storage and milling room is usually separated and sealed off from the brewing room. Often the grain is milled, mashed in, and piped directly into the mash tun. At home, don't mill the grain anywhere near the kettle in which you'll be chilling your wort.

If you choose to buy a mill for use at home, you may also want to think about the extra cost of scales for weighing bulk grain. You can weigh out whole grain at your supply store and mill it at home, but you may want to buy enough grain for several batches of beer and mill it as needed.

An alternative is to use emptied coffee cans of various sizes, measuring your large grain bills by volume. This is actually a good thing. Grain weight changes with moisture content, and measuring by volume from a calibrated container ensures consistent grain quantity from batch to batch. Just fill each of your various containers with grain and weigh the contents using any scale available, marking the weight capacity on the can itself.

Most homebrew supply stores have ample containers for use by grain brewers to measure grain and to store crushed malt temporarily. When purchasing grain for a single batch, all the grains can be weighed and poured into a single container. Then you can load the mill hopper from that container, milling the entire grain bill together.

After measuring out the malt using any convenient technique, pour the grain into the mill hopper. Some mills come with large-capacity hoppers that hold as much as six pounds of malt, and your store may have modified its mill to hold even larger amounts.

If the mill is motorized, start it up; otherwise, start cranking. Mill only the grain you're going to use, if possible. This is like grinding coffee beans — the coffee stays freshest in bean form. If you mill too much and just can't use it all, seal the remaining crushed grain in a large, plastic, food-storage bucket until it's needed.

Try Before You Buy

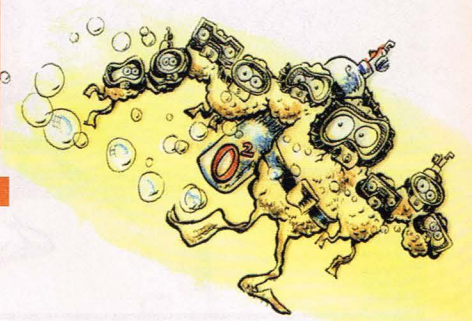
If you're ready to get into brewing from scratch or just want to put some specialty grains in a pot and add the tea to your extract beer, then you're ready to try crushing some grain. Make a phone call or two, and find a supply shop that already has a mill set up for customer use. Find out what mill they're using, and stop in and give it a try. Whether you mill at home or at the store, you're sure to enjoy your beer even more after adding grain to the picture. ■





SHAWN TURNER ILLUSTRATIONS

THE TRUTH ABOUT YEAST

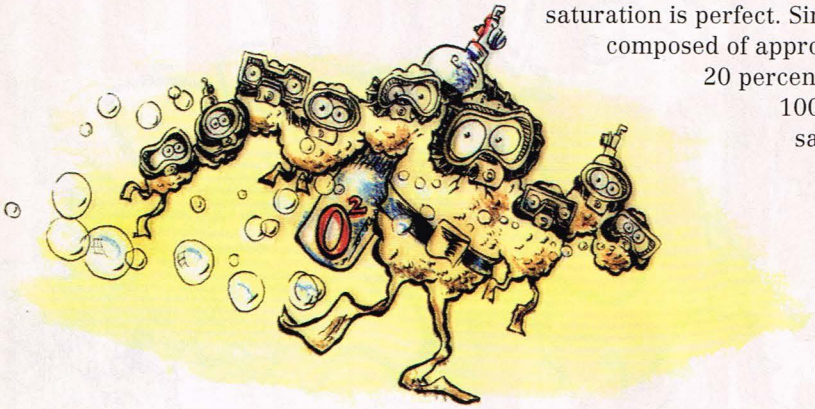


by Scott Lowry

Open that homebrew book and find the perfect recipe, perhaps an India pale ale. Lots of malt, a ton of that popular Yakima Valley hop that you love so much, and the brewer even tells you how to adjust the water to achieve the perfect result. But wait, what about the yeast?

Yeast is the single most important contributor to beer flavor and the cause of more funky, scary, wild homebrew flavors than anything else.

Add a little too much crystal malt to your IPA and you will have a darker beer with more caramel flavors, but add too little yeast (or worse yet, contaminated yeast) and you may end up with anything from a pineapple and banana beer to a cardboard and vinegar ale. Ferment this concoction at the wrong temperature and your problems multiply. With a few easy steps you can take the Russian Roulette out of yeast pitching and control the flavor of your precious homebrew.



Fresh Air

After it's boiled, the wort is totally devoid of oxygen. In this type of medium, yeast must depend on its existing supply of glycogen (stored carbohydrates) for energy required for growth. How would you like to be asked to reproduce several times over without so much as a snack in between? The yeast might be able to do it once, but after that, it's through.

Lucky for us, it doesn't take much oxygen for the yeast to do their dirty deed. About 20 percent oxygen saturation is perfect. Since air is composed of approximately 20 percent oxygen, 100 percent saturation with air will create the same effect (the 79 percent nitrogen in air is extremely insoluble in wort). The trick is to get the oxygen to the yeast without introducing bacteria, which could cause off-flavors.

There are a few things that can be done to increase the rate of oxygen transfer into the wort. The first is to increase the gas/liquid interface area. Splashing the wort into the fermenter or shaking the fermenter creates bubbles that increase the surface area and therefore increase oxygen transfer. A carbonation stone (also called an aerating stone) is a device that forces a gas into tiny bubbles, thereby increasing the gas-liquid surface area.

The temperature of the wort greatly affects the equilibrium concentration of the wort. Equilibrium concentration is simply the point at which the same amount of gas is being dissolved into a liquid as is being released. Lowering the temperature of the wort allows oxygen to travel much more quickly to the hungry yeast.

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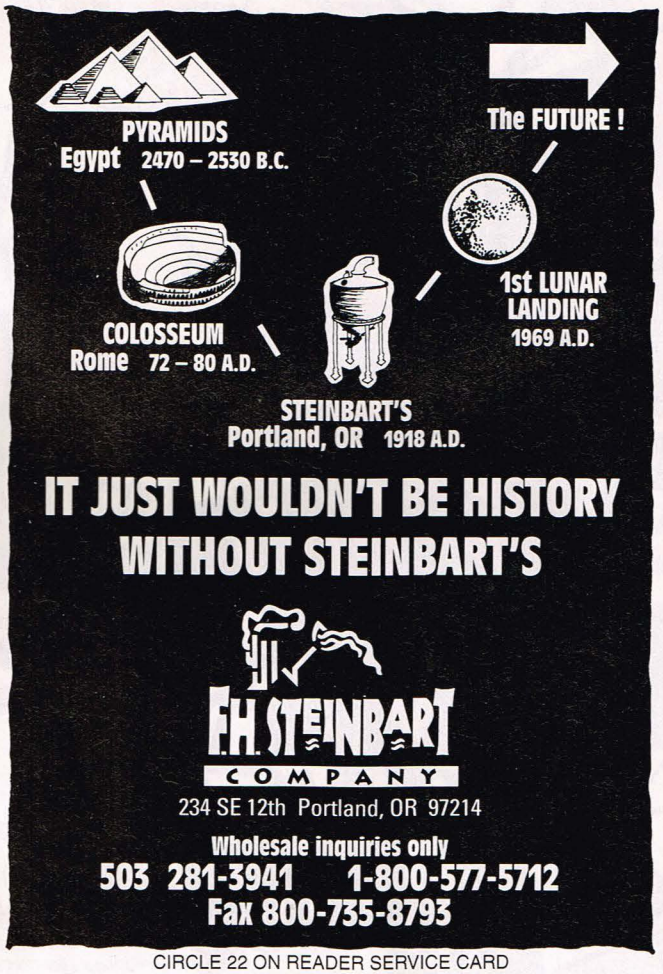
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Pressure is another factor in the equilibrium concentration of oxygen in wort. If you're fermenting in cornelius kegs or other vessels that can withstand it, try applying pressurized air to aid aeration.

Finally, the rate of aeration depends on the type of gas being absorbed into the liquid. Oxygen is absorbed much easier than nitrogen. Bubbling pure oxygen into the wort will transfer oxygen five times faster than bubbling with air (which is only one-fifth oxygen).

Heavy Breathing

Finding a way to introduce oxygen into the wort is the easy part. Getting it into solution without introducing beer spoilage organisms is a challenge for which there are at least a hundred practical solutions. One such solution is the Oxynater by Liquid Bread Inc., Orlando, Fla. This system costs about $39.95 and is said to oxygenate 75 to 100 gallons. Replacement tanks are available for $11.95 each. This appears to be an excellent method of oxygenation, but at a cost of approximately $2.50 per five-gallon brew for the first 15 to 20 brews and around $1 per brew after that.

An alternative method is to use an aquarium-type aerator with a filter to remove microorganisms. A typical kit includes the air pump, a carbonating stone, air hose, and a filter. You may find, however, that the filter blinds easily.

Instead of using the filter provided, you can make your own with a two-inch piece of pipe and two quarter-inch hose barbs. Fill the two-inch pipe with cotton that has been sprayed with 70 percent ethanol (diluted grain alcohol) to filter and kill any microorganisms. The carbonating stone and air hose are soaked in a 50-parts-per-million iodophor solution before use (concentration dilutions are listed on the back of the iodophor bottle). The residual iodophor is blown out of the tube by the air pump and drips off the outside of the hose.

This system causes a lot of foaming. You may have to turn the air on and off five or six times to get 45 to 60 minutes of aeration. The only aeration supplies you will need to replace each brew are a cotton ball and a squirt of alcohol.

Pitching Is the Key

Once the wort is properly oxygenated, it must be pitched with the proper amount of yeast. The standard pitching rate used by the big brewers is one million cells per milliliter per degree Plato (or approximately 12 million cells per milliliter).

That's an easy value for the big guys to determine with their microscopes, hemocytometers, spectrophotometers, and williwonka-umpalumpometers, but what about the homebrewer and his hydrometer?

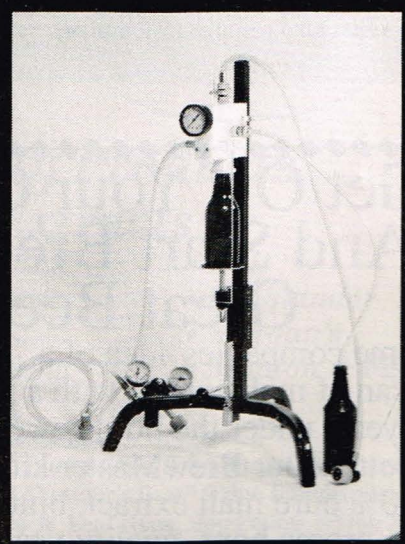
Several sources estimate that this pitching rate is equal to approximately 50 milliliters of yeast slurry per gallon of wort. This means that if you save 250 milliliters (approximately eight ounces) of thick yeast from the bottom of a starter or previous fermentation, you will be somewhere in the ballpark of 12 million cells per milliliter. This pitching rate will allow yeast to grow enough to replenish its supply of healthy young cells but not so much as to produce off-flavors in the finished product.

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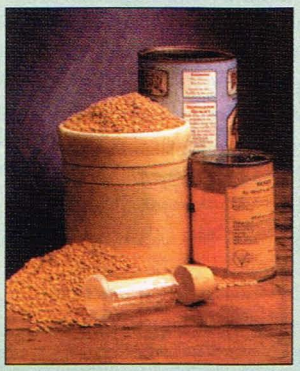
Meals Discriminating Yeast Prefer

Scientifically speaking, yeast are protists. The protista are organisms that possess characteristics of cells of higher organisms but show a simpler level of biological organization.

This means that unlike other single-cell organisms, yeast contain organelles — cell parts that function like organs. Under a microscope, brewer's yeast, called Saccharomyces Cerevisia, appear as circles.

These organisms reproduce primarily by cell division (budding). For yeast to survive and multiply, certain growth materials must be present in their environment. Among these requirements are fermentable carbohydrates: glucose, fructose, sucrose, maltose, and maltotriose.

Yeast also require free amino nitrogen for protein synthesis and molecular oxygen for the synthesis of lipids and sterols, both important components of the cell wall and membranes. As brewers our responsibility is to feed these hungry protista with a healthy supply of their required nutrients. Fortunately for us, all required nutrients may be found in that favorite all-malt brewing recipe.



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Malt is relatively high in protein (approximately 1.5 to 2.0 percent), and well-modified malt is high in free amino nitrogen; 100 ppm of free amino nitrogen is required for normal yeast growth, and this value will always be exceeded by an all-malt (no corn or rice adjuncts) brew.

Fermentable sugars are derived from the malt extract or grain. As long as proper mashing procedures are used, the spectrum of these sugars will be approximately 70 percent fermentable sugars and 30 percent unfermentable dextrins. The only nutritional requirement that must be added by the faithful master of the yeast is oxygen.

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Single-Cell Scourges

Wort oxygen and pitching rates are important factors in yeast flavor, but what are the consequences of underpitching or underaerating? When yeast is introduced to beer at the proper rate of 10 to 12 million cells per milliliter, it wants to grow to achieve a concentration of around 60 million cells per milliliter. This is equal to a sixfold growth, or about 2.5 doublings of the population.

If the same yeast is introduced at a much lower rate (1 million to 2 million cells per milliliter), it will still try to grow to 60 million cells per milliliter. However, instead of doubling 2.5 times, it must double six times to grow to this proportion. This growth takes time, which leads to a lag in fermentation.

During this lag time the wort is susceptible to contamination from other microorganisms. Additionally, this yeast growth increases the level of esters such as isoamyl acetate (the banana ester) and the level of fusel alcohols. Lower pitching rates also increase the level of diacetyl (a buttery or rancid flavor).

The effects of a lack of wort oxygen are most pronounced when reusing under-oxygenated yeast. This yeast, which may have reproduced three or four times with very little oxygen to replenish its membranes, is weak and will not be able to proceed along the proper fermentation pathway. A gross lack of oxygen will immediately decrease the health of the yeast, causing increased ester formation and possibly a stuck fermentation.

One very important factor in any fermentation is the temperature. Often homebrewers ferment at a much warmer temperature than optimal for the particular strain. Most ale yeasts ferment very cleanly (and quickly) at 58° to 60° F, while lager yeasts show their best character down around 46° to 48° F.

Increasing the fermentation temperature above these values will cause fermentation to occur more rapidly, but it will also increase the level of esters, possibly producing a winey and fruity product. Higher levels of fusel alcohols may also be a result, increasing the aroma and fragrance of the beer as well as the headaches of the beer drinker.

Conversely, fermentation temperatures that are too low may cause a premature flocculation of the yeast and a corresponding stuck fermentation. In any event a cooler fermentation will be slower and cleaner.

If you keep records concerning your homebrewing efforts, remember to record what you did with the yeast. That award-winning IPA will taste great if well aerated, pitched with the right amount of healthy yeast, and fermented at the correct temperature. But if you change any of these variables, you will change the final product.

Next month: Preparing a yeast starter.

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BREWING WITH WHEAT

by Jeff Frane

The history of brewing is a story of barley. Although "beer" can be brewed from any malted grain, the structure of barley has always been like a gift from Providence: the perfect grain for malting, mashing, and brewing. Through the centuries, however, other cereals have been used in conjunction with barley, frequently for economic reasons. In many cases these grains have placed their special stamp on brewing, creating distinctive beer styles.

The staple grain of Europe is wheat. While its primary function has been the production of bread and pasta, wheat has also found its way into the creation of distinctive beers. The early weissbiers astounded drinkers with their pale color (they were "white" beers while others were "brown"), and many craft brewers offer wheat beers as their palest selection today. Belgian brewers seemed to have a particular affinity to wheat, which lends some of the special quality to lambics and witbiers. Even British brewers use wheat as a secret ingredient in their ales.

Brewers use wheat along with barley because of wheat's soft, crisp flavor — a special quality that works well as a background for additions of berries and other fruits. Beer drinkers seem to love the "natural" quality of wheat beers, which are often hazy with proteins and offer a distinct contrast to the brightly filtered "industrial" brews. Something about wheat lends itself to summer-time refreshers, whether they be Bavarian weissbiers, Belgian witbiers, or American wheat beers.

Wheat is What?

For most brewers malting barley is simply a choice of two-row or six-row. Wheat, on the other hand, is subject to a bewildering array of terms.

Wheats are defined as "hard" or



While the majority of harvested wheat goes into noodles or items found on bakery shelves, the grain gives beer a dense, long-lasting head and an appealing mouthfeel.

"soft," which refers to the kernel's texture. "A hard wheat kernel requires greater force to cause it to disintegrate than does a soft wheat kernel. The flour obtained from a hard wheat kernel has a coarser particle size than does flour from a soft wheat kernel," notes "Soft Wheat Products," a publication of the American Association of Cereal Chemists.

Clear enough, but things are never so simple: The terms are not used worldwide. In Western Europe the term "hard" wheat refers to durum wheats, which are grown for pasta production. "Soft" wheats are any cultivars of a common genus, Triticum aestivum. Elsewhere, the terms are understood to mark distinctions within T. aestivum.

Generally speaking, hard wheats have the higher protein content, and their flour is used for bread. Soft wheats, which mill to a finer particle size, are used for cakes and cookies.

Wheats are also defined as "red" or "white," the color of the seed coat. In the US red wheats (usually hard red wheats) are grown throughout the Great Plains states. In the UK, with its damp climate, only red wheats are cultivated. Both white and red wheats are grown on the European continent.

Finally, wheats are defined by the season in which they are sown (not harvested): Spring wheats are planted in the spring, winter wheats in the late summer or fall. Most modern soft wheats are winter wheats, which have lower protein levels than spring wheats.

The needs of the brewing industry control farm production of barley, but since almost all the wheat grown in the world ends up in bread, cakes, cookies, or some form of noodle, the brewer's needs are simply not a concern. For the most part brewers work with what they have.

Barley and Wheat

The most striking physical difference between barley and wheat is that wheat lacks barley's familiar husk. The kernel is also a different shape — more rounded than barley, with a pronounced groove. Chart 1 illustrates the essential differences in composition. Wheat is significantly lower in cellulose and lipids, and higher in protein and starch than barley.

The varying protein level is the most significant difference. For one thing, wheat offers higher yields. Typical pale malt extracts run from 80 to 83 percent, while wheat malt extracts run from 84 to 88 percent.

The higher protein levels of wheat greatly enhance its contribution to foam stability — which means a better, longer-lasting head on the beer — and increase the beer's mouthfeel (its sensation of fullness in the drinker's mouth). The downside, and there always seems to be a downside, is that the higher protein levels can create problems in the brewhouse and make the beer hazy. Filtering out the haze can lessen the finished beer's stability.

Not only are the levels of proteins different between barley and wheat, but the proteins themselves are different. Glutens, which are so critical to the formation of a good bread loaf, are virtually non-existent in barley yet make up 80 percent of wheat proteins. These high-molecular-weight proteins, which allow a loaf to stretch and then hold its shape, are the same proteins that can build a dense head in beer.

Wheat Malt

Most brewing wheat has been malted. Just like barley malt, the grain is steeped in cold water, allowed to germinate, then carefully dried (kilned). In the malthouse the brewer takes up where the maltster left off, continuing the process that allows the natural enzymes to break carbohydrates down into simple sugars for fermentation.

Traditionally, the weissbiers ("white" beers) of Bavaria have been brewed with up to 60 to 70 percent wheat malt, combined with 30 to 40 percent barley malt. In the US many (most?) craft breweries make at least one wheat beer, with a lower portion

Chart 1: Composition of Barley Vs. Wheat

Compound	Barley (%)	Wheat (%)
Cellulose	5.7	2.9
Starch	71	76
Lipids	2.5	2.0
Other nitrogenous matter	4.0	2.8
Protein	11.8	14.5
Ash	3.1	2.2

Modern Cereal Chemistry, *D.W. Kent-Jones & A.J. Amos, Food Trade Press Ltd., London, 1967.*



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CIRCLE 44 ON READER SERVICE CARD

Chart 2: British Ales with Wheat Flour

Mild Ale (OG 1.037)		Bitter (OG 1.041)		Sweet Stout (OG 1.040)	
Wheat flour	10%	Wheat flour	10%	Caramel	2%
Invert sugar	15%	Cane sugar	10%	Glucose syrup	2.5%
Mild ale malt	73%	Pale ale malt	76%	Black malt	3.5%
Black malt	2%	Crystal malt	4%	Wheat flour	10%
				Mild ale malt	82%

Malting & Brewing Science, *Hough, Briggs, Stevens, Young, Chapman & Hall, London, 1971.*

(40 to 50 percent) of malted wheat. And in England it is not unheard of to add a portion (up to 20 percent) of wheat malt to the grist to add to the beer's head retention.

The physical and chemical differences between barley and wheat make malting the wheat a difficult proposition. Because wheat lacks the thick barley husk, it absorbs water more quickly, and steeping times are shorter. The grain also reaches modification more quickly than barley, but wheat malt is relatively less modified than barley malt. Kilning is done at lower temperatures than for barley, yet the higher protein content assures a slightly darker color, even in the palest wheat malt.

The Germans produce dark wheat malts, intended for dunkelweizens and weizenbocks, although this is not a common ingredient here in North America. Years ago, homebrewers in the Portland, Ore., area were given a supply of roasted wheat malt, a strange ingredient indeed. It would probably have a considerable novelty appeal to today's adventurous homebrewers.

Most weissbiers are brewed with decoction mashes, intended to break down the heavy proteins so that they don't clog runoff from the lauter tun or produce an undesirable chill haze, and to increase the available amino acids. The decoction mash also increases malt flavor and heightens color. The malts are mashed in at 95° to 99° F and then raised to a suitable protein rest (indeed, some weissbier brewers use a staggered protein rest at slightly different temperatures to encourage different enzymes).

Like decoctions, step infusions are useful in precipitating the proteins so that they become evenly distributed throughout the grain bed. As in the decoction mash, the process will benefit by a low mash-in temperature and a substantial protein rest. Single infusions, however, can create a dense layer of precipitated protein on top of the grain bed that can interfere with lautering.

At lower percentages (5 to 20 percent) of the grist, wheat malt can be added to any number of beer styles — including British ales — to enhance the head retention without clarity problems. This is true even with a single infusion, although the barley malt should be well modified. In fact "the use of wheat malt at up to 20 percent of the total grist has been claimed to strengthen the yeast, and improve the clarity and head retention of the beer," according to *Malting and Brewing Science*, the classic brewing text.

Barley husk is a crucial element in mashing, as it provides a natural filter bed during lautering and run-off of the sweet wort. Since wheat has no such husk, grists with a high percentage of wheat malt may require special effort.

One solution is to wet the barley malt before milling (not a bad idea at any time, as long as the crushed grain is going directly to the mash tun) so that damage to the husk is minimized. In any case problems with set mashes (in which the flow of wort from the

Witbier
(all-grain, 5 gallons)

Ingredients:

- 5 lbs. lager malt
- 4 lbs. flaked wheat
- 0.5 lbs. rolled oats
- 1 oz. East Kent Goldings hops (3.7% alpha acid) for 60 minutes
- 1 oz. freshly ground coriander for 30 minutes
- 1 oz. bitter orange peel (shaved) for 30 minutes
- Wyeast 3944

OG=1.052
TG=1.010

Step by Step:

Mash in at 110° F, then raise to 132° F and hold for 30 minutes. Raise to 152° F and hold for starch conversion. Sparge to 6.5 gals. and boil for 30 minutes. Add hops and boil 30 minutes. Add coriander and orange peel and boil 30 minutes more. Cool to pitching temperature, aerate thoroughly, and pitch 2 qt. starter of yeast. Ferment at 65° F for one week, rack to secondary, and follow normal bottling or kegging procedures when fermentation is complete, increasing your usual priming sugar by one-third. Lactic acid can be added at bottling (about 10 to 20 ml of 88 percent lactic acid).

lauter tun slows to a trickle) can be reduced through several methods. Lautering should be slower than normal, and it's valuable to have water above the false bottom before the grain is put into the lauter tun. In the weissbier brewery the grain bed is frequently (or even continuously) cut with rakes, and the homebrewer can follow a similar procedure with a knife or paddle. Shallow grain beds, rather than deep, will help keep the bed from packing down.

At least one commercial brewery has used spent, whole hops from previous brews as the filter bed in the lauter tun for a wheat beer — a solution that may not be practical at home. One homebrewer has suggested the use of flavor-neutral rice hulls, mixed into the grain bed, to substitute for the missing barley husks.

Preferred Analysis of Wheat Malt

Extract, dry weight, percent	>83.0
Protein, dry weight, percent	<12.5
Fine/coarse grist difference, percent	<2.0

German Wheat Beers, *Eric Warner, Brewers Publications, 1992.*

Raw Wheat

Just as malted wheat is crucial to Germany's wheat beers, unmalted, raw wheat is essential to several Belgian styles. Raw wheat produces beers less sweet and full bodied than those made with malted wheat, making it an excellent choice for the more crisp and refreshing styles. At least one microbrewery has used raw wheat in its version of an American wheat beer.

Up to 40 percent raw wheat is used in lambic beers, along with pale malt. The mashing processes vary from brewery to brewery and are wildly different from "normal" procedures. The wort is never as clear as most brewers would demand (rather it is "turbid"), and the wort composition is very different from standard worts. Lambic brewers formerly used wheat chaff to build a filter bed and enhance lautering. As hard as it is to imagine lambic brewers changing with the times, this practice has apparently faded away.

Witbier, the Belgian version of "white" beer, is likewise made from unmalted wheat (50 percent) and malted barley (along with an occasional addition of oats). Witbiers can be brewed from step infusion or decoction mashes, but long protein rests (45 to 60 minutes) are necessary to allow any lautering at all. Care is taken so that some proteins remain to provide the defining golden haze.

Raw wheat creates special problems in milling because the kernel is extraordinarily hard. For this reason soft wheats are definitely an advantage. A good roller mill is essential, and an adjustable mill may be necessary to ensure that the crush is correct. If the proportion of raw wheat is to be very high, it's important not to pulverize all the wheat into powder but to achieve a good balance of grits and flour.

Flaked Wheat

Flaked wheat can be a useful substitute for raw grain. While it retains much of the special character of the raw product, flaked wheat is much easier to handle, primarily because it requires no milling. Like flaked barley, maize, and oats, it can be added directly to the barley malt in any mash. It is, however, much more expensive than raw wheat. Like raw wheat, it's especially suitable for drier, crisper beers than for Bavarian-style weissbiers.

Wheat Flour

While its use is virtually unheard of in the US, wheat flour has been an acceptable brewing addition in the UK. Soft wheat flour, with its relatively lower protein, is preferred (homebrewers might try cake flour). In order not to interfere with good lautering, it should be well mixed with the crushed malt. At preparations of about 10 percent of the grist, it is an inexpensive method of enhancing head retention in British-style ales (see Chart 2, page 36).

Wheat Extract

Malted wheat is available to homebrewers in syrup form, either blended with barley malt or as pure wheat malt extract (how do they do that?). Using extract, of course, means that a brewer could produce a wheat beer that was 100 percent wheat, although adding a mini-mash of crushed grains always seems to improve extract-based beers.

American Wheat
(all-grain, 10 gallons)

Ingredients:

- 10 lbs. wheat malt
- 6 lbs. 2-row lager malt
- 2 oz. Perle hops (7% alpha acid) for 60 min.
- 1 oz. Willamette hops (4% alpha acid) at end of boil
- Wyeast 1056

OG=1.044; TG=1.008

Step by Step:

Mash in at 110° F, then raise to 122° F and hold for 30 minutes. Raise to 154° F and hold until iodine test is negative. Sparge to 11 gals. and boil for 30 minutes. Add the Perle hops and boil 60 minutes. Add the Willamette hops and turn off heat. Cool to pitching temperature, aerate thoroughly, and pitch 2 qt. starter of yeast. Ferment at 65° F for one week, rack to secondary, and follow normal bottling or kegging procedures when fermentation is complete.

Notes: During the boil, expect lots of ugly-looking flakes, far more than in a typical all-barley malt beer. Initially it might look like a layer of scum on the surface (familiar to people who have made chicken stock), and eventually, great ugly lily pads can form, which should be skimmed from the boiling wort.

The final beer is very crisp and bright, with no appreciable chill haze, and a dense, white head. The finishing hops give a nice floral finish to this beer.





RICK HUDSON

FASTER THAN A SPEEDING BREWPOT

by Nico Freccia

With a little planning, some creative techniques, and the right equipment, you can drastically reduce your brewing time, still make great beer, and have fun too.

Do you ever feel like you just can't find the time to brew? It takes too long, there's too much to think about, too much to do. If that sounds like you, maybe it's time to assess the way you brew. You can cut down your brewing time. Just do a little planning and follow a few simple guidelines. Whether you are brewing all-grain or extract, you needn't spend a lot of time in the brewhouse on brew day.



RICK HUDSON





Set aside a half day here and there for brewing and a few minutes in between to plan your brews, and you'll put the spark back in your brewing relationship. Spend some quality time with your hobby, not quantity time.

Simple Principles of Efficient Brewing:

1 Do everything in advance that you possibly can.

2 Write a plan for your brew day and stick to it.

3 Simplify your process as much as possible.



4 Learn to do two or more things at once.

5 Invest in equipment that will aid efficiency.

6 Eliminate unnecessary steps.

7 Clean all equipment thoroughly after use, before it is put away.

8 Enlist the help of a friend and share duties.

Brewing is waiting. Waiting for water to boil, waiting for enzymes to do their job, waiting for sugars to be rinsed, waiting for liquid to boil again. The key to an efficient brew day lies in both minimizing waiting time and turning necessary waiting time into productive hours instead of lost hours.

There will be times during the brew when you have things to do immediately to prepare the next step, and there will be times when you have considerable time gaps with nothing to do. Use those gaps to be creative, take care of business, or just have fun.

Planning

There are two stages to planning. The first is the ongoing process of thinking about your brew. This may happen consciously, or you might one day just wake up and decide what you want to brew next. Appreciate the fun you can have planning and setting up the brew, and take care of some of the logistics well in advance of the brew day.

Stage One Planning:

1 Make a list of all ingredients, including malt, hops, and yeast. Also include gypsum, Irish moss, and priming sugar as needed. Buy the ingredients well in advance. Make sure you have the right equipment and

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accessories on hand for the whole process to minimize trips to the homebrew shop. This includes items such as bottle caps, airlocks, and hoses.

2 If you're using liquid yeast, prepare yeast starter in advance. Leave plenty of time to culture them up to the proper pitching amount.

3 Do all calculations in advance. Many of these you'll do when making your ingredient list: grain amounts, target gravity, color, and bittering units. Calculate others as well, such as mash water volume and strike temperature, sparge water temperature, and length of the boil.

Stage Two Planning:

Stage two consists of all those things you can do the night before your brew day to make your job easier.

1 Write a plan for your brew day. Write down specific times and record each step in the process. Think in advance about ways to save yourself time and do two things at once.

2 Measure out hops and other ingredients, such as specialty grains for steeping, and place them in individual bags or containers labeled for quick use.

3 Do any set-up that you can. If possible, rinse and set up equipment such as the kettle to heat the mash water for the start of the day. Or assemble the mash tun and fill it with grain. If you filter your water, filter it the day before and fill the kettle. All of this preparation takes only a few minutes in advance but will add up to time saved on brew day.

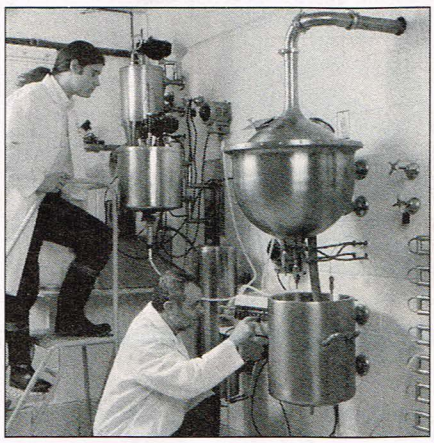
Time-Saving Tricks

Now that you're practicing good principles of planning and are managing to get more done in less time, use a few tricks to shave off more minutes.

1 Purchase good equipment. Using well-made, efficient equipment is one of the most effective ways to make your brew day faster and produce better results. Equipment that is easy to clean and assemble or disassemble is crucial. Mash tuns with a greater surface collection area will give you higher extract in less time, for example. Some other key equipment:

• A powerful propane burner. Heating water and bringing wort to a boil are two of the most time-consuming steps in brewing. Powerful burners (100,000 BTUs or greater) can boil 10

GET SERIOUS.



As you consider scaling up your brewing to the next level, you probably want to think about raising your level of knowledge as well.

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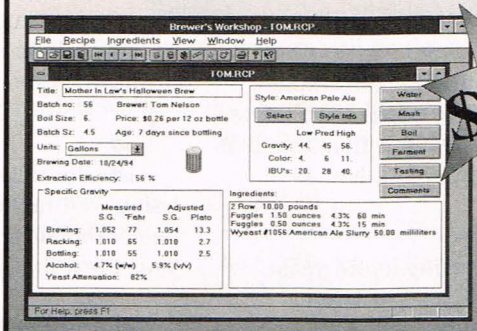
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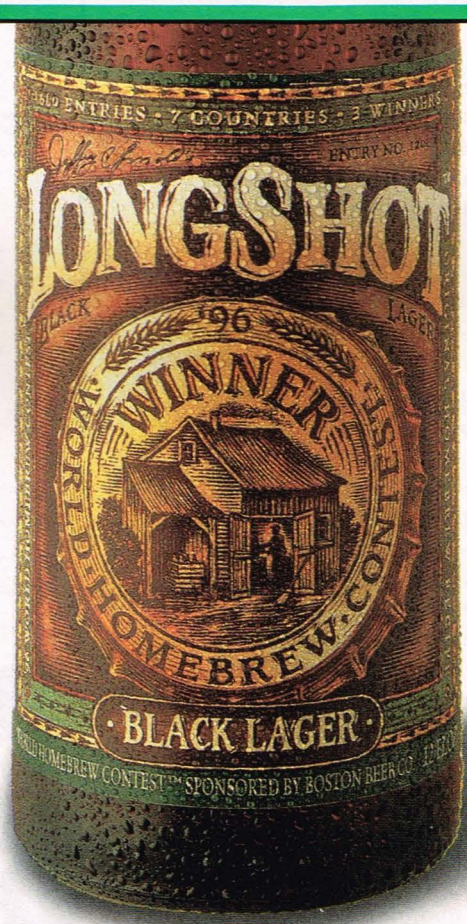
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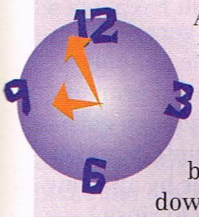
The Ultimate Brew Day

If you had an outdoor or garage space, a good burner, a simple pump and a counterflow wort chiller, just how efficiently and quickly could you brew? Following is a scenario to consider.

NIGHT BEFORE

Set up burner, rinse kettle. Filter water, fill kettle, cover. Assemble mash tun, fill with grain.

9:00 a.m.



All-grain: Begin heating mash water.

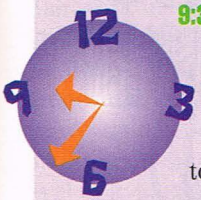
Extract: Warm extract cans, begin steeping grain in grain bag, turning burner down for a slower heat.

9:20 a.m.

All-grain: Stabilize at strike temperature of 178° F. Run off into mash tun. Check temperature. Begin timing mash. Measure and begin heating sparge water. Finish

MASH REST BREAK

Assemble all hoses, airlocks, fermenters, and other equipment, measure hop additions, de-label all those bottles, clean and put away used equipment.



9:30-9:45 a.m.

Extract: As water reaches a boil, remove grain bag, turn off heat, add extracts. Bring back to a boil.

10:00 a.m.

Extract: Begin timing boil.

10:00-10:20 a.m.

All-grain: Pump 185° F sparge water from kettle through wort chiller to hot liquor tank. Check mash for conversion. Begin running off wort; recirculate 15 minutes to clear.

BOIL BREAK

Clean and sanitize fermenters, airlocks, transfer hoses, and other equipment. Clean wort chiller. Fill a bucket with sanitizing solution, sanitize chiller by pumping solution through or by siphoning through by gravity.

10:30 a.m.

All-grain: Begin sparge. Set hot liquor and wort flows to maintain a few inches of water on top of grain bed.

11:00 a.m.

Extract: Boil finished. Cover, whirlpool, begin chilling.

11:20-11:30 a.m.

All-grain: Sparge finished. Kettle is fired, heating wort.

Extract: Chilling complete. Run off to fermenters, pitch, aerate.

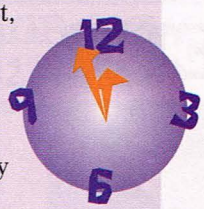
11:30 a.m.

Extract: Begin clean-up.

11:45 a.m.

All-grain: begin timing boil.

Clean used equipment, clean and sanitize wort chiller, mow the lawn.



12:00 noon

Extract: finished! Play golf.

12:45 p.m.

Boil finished. Whirlpool, begin chilling.

1:00-1:15 p.m.

Chilling finished. Run off, pitch, aerate.

1:30 p.m.

Start clean-up.

2:00 p.m.

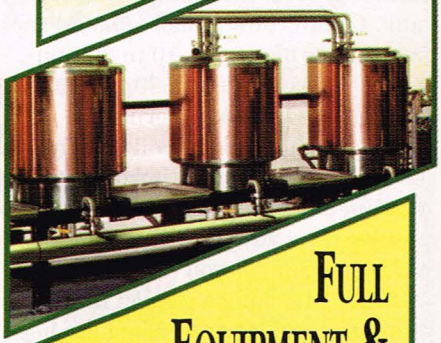
Finished! Go to brewpub for lunch.

Total Perfect All-Grain Brew Day: 5 hours

Total Perfect Extract Brew Day: 3 hours

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gallons of cold water in 25 minutes. Propane burners range from $35 to $80, but a sturdy, high-output jet burner can generally be found at restaurant or homebrew supply stores for about $50. Time saved: 20 to 30 minutes.

• Wort chiller. If you are not already using a wort chiller, adding one now will make your day much faster and minimize your beer's risk of contamination. Good counterflow chillers are the fastest and can easily be sanitized by pumping hot sparge water from the kettle through the chiller on the way to the hot liquor tank. Counterflow chillers should cool five gallons of wort in 10 to 20 minutes. They cost $50 to $80, but making your own is a cheap alternative.

Immersion chillers will cool five gallons of boiling wort to pitching temperature in 30 to 45 minutes. They can be purchased at your local supply shop for as little as $25, or you can make your own. Try attaching a garden hose to the immersion chiller and coiling the hose in an ice bath to speed up the chilling time. Time saved: one to three hours.

• Pumps. Pumps are handy for brewing large batches in all-grain systems and for sanitizing. Simple pumps operated by a power drill can be found for less than $20 and will help you move large volumes of sparge water quickly. Small pumps with their own motors run around $80. Time saved: five to 10 minutes.

• Bottle washers, mini-kegs, and CO_2 kegging systems. Mini-kegs hold about a 12-pack of beer, are naturally conditioned, and dispense with small CO_2 cartridges. Cleaning, sanitizing, and filling one mini-keg will save substantial bottling time and is a cheap alternative to full keg systems. Mini-keg systems with kegs, tap, and CO_2 cartridges can be purchased for $50.

Full kegging systems will cut your bottling day from about four hours down to one. The disadvantage is the cost. Full keg systems cost $130 to $200, and you will need a spare refrigerator to cool the kegs.

Don't worry about contamination — the only time it is a real concern is during the chilling and carboy-filling stages.

2 Work in an open garage or outdoors. Working outside not only allows you to use a powerful propane burner (do not use one indoors; carbon monoxide gas will build up!), it makes clean-up faster and easier by allowing you to use a garden hose to rinse everything off. Don't worry about contamination — the only time it is a real concern is during the chilling and car-

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CIRCLE 79 ON READER SERVICE CARD

boy-filling stages. Just keep a tight lid on the kettle.

3 Simplify.

- Spend a few minutes to set up everything and anything that you possibly can the day before you brew.
- Use simpler techniques: Put hops and grains in boiling bags instead of adding them loose to the wort and straining after the boil, for example.
- Don't make extra work for yourself by sanitizing items that don't need it. Remember that your equipment should be clean, but nothing needs to be sanitized until the last stages of the brew: chilling and carboy filling.

4 Work with a friend. While brewing with a partner doesn't make the day go faster, it does make clean-up easier and provides for breaks during which each of you can get other work done.

- Try splitting the day. One of you starts the brew and brews through the sparge. Then the other comes on and finishes the brew through pitching.
- Take blocks of time out. During a waiting time, one can take a few hours to run errands, returning to provide a break for the other.

Minimizing Bottling Time

Bottling can be a tedious and time-consuming operation. Most of the work involved with bottling comes from the need to clean, de-label, and sanitize lots of bottles. The most important thing you can do is to make sure you thoroughly clean all equipment immediately after use. Then you will only need to rinse the equipment off and sanitize it on bottling day.

1 Rinse bottles completely with warm, soapy water after each use and store them in a box or enclosed space where they will not collect dust.

2 Set a limit to the accumulation of new bottles that will need label scraping. For example, every six new bottles collected will be de-labeled, cleaned, and put away.

3 If you have a dishwasher, use the "heat dry" cycle to sanitize bottles.

4 Use a dilute sanitizing solution that does not need to be rinsed.

5 Use large (22-ounce) bottles and/or mini-kegs.

6 Invest in a kegging system. For large batches you will immediately cut your bottling time in half.

The few hours you actually spend making and bottling beer should be well worth the accomplishment of having fresh, hand-crafted beer to share with your friends. After all, brewing beer should not be a chore. Enjoy yourself and make the whole process fun.

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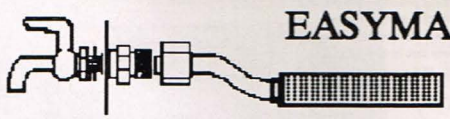
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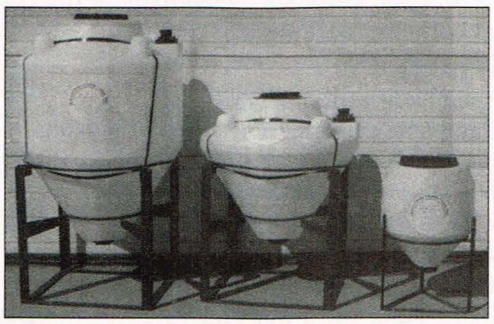
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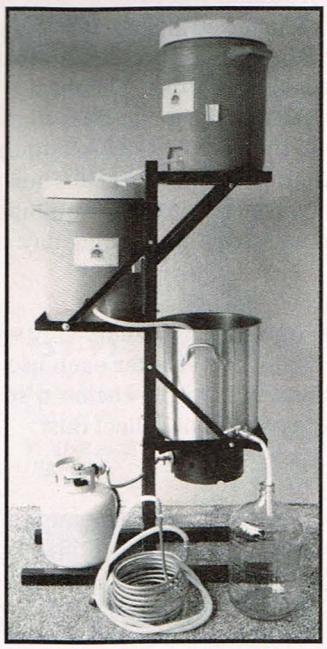
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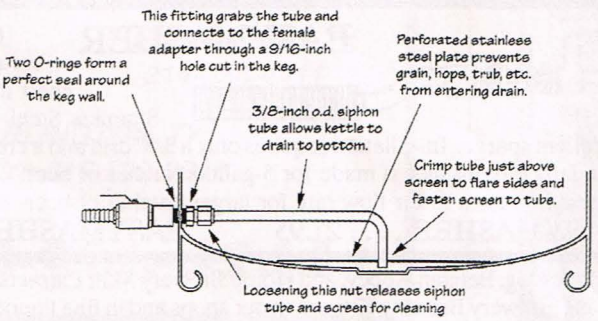
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CIRCLE 68 ON READER SERVICE CARD

Micro Dream: Brewing the First Beer

by Richard T. Curtin

This is the final installment of a three-part series on homebrewer Michael Bryant's effort to open a microbrewery in Dunedin, Fla.

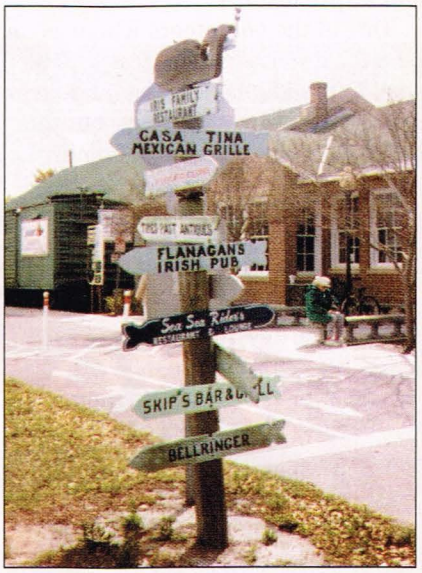
After a year of hard work and a $45,000 investment, Michael Bryant's Dunedin Brewery was ready to roll by mid-spring this year.

All the permits were signed and approved, inspections completed, local government types satisfied, Bureau of Alcohol, Tobacco and Firearms agents happy, equipment purchased and hooked up for the first brew, and the ingredients were sitting by the kettle. Dunedin Brewery Beach Tale Brown was about to make its first appearance.

But there was a hitch.

Unfortunately, Dunedin Brewery did not have a distributor, and because of Florida's three-tier system, Bryant could not sell beer without one. The three tiers of the alcoholic beverage distribution system are the manufacturer (Dunedin), which ships its products to the wholesaler or distributor, which in turn sells them to the retailer. Bypassing the middle tier is illegal in most states.

The dilemma for Bryant: Find a wholesaler large enough to build distribution for his product yet small enough to pay sufficient attention to a fledgling brand.



Dunedin has lots of restaurants and bars — but would they be able to get Dunedin Brewery beer?



Before he could legally sell his beer, Bryant was promoting it at parades and other citywide events.

"Legally, once you are connected with a distributor it's very difficult to break away if you're unhappy with their service," he says. Bryant decided to look for a small distributorship run by a homebrewer. "Most of the bigger distributors really have no concept of the homebrewing mentality; they are disconnected from the microbrewery concept," he says.

From a distributor's standpoint introducing a new product is always more work than pushing an established brand. Furthermore, many distributors in Florida are already committed to representing the larger beer brands and feel that representing a smaller, competing brand might jeopardize their position with their larger clients, according to Bryant.

While the search for distribution went on, Bryant decided to forge ahead

with his first official batch of microbrewed beer.

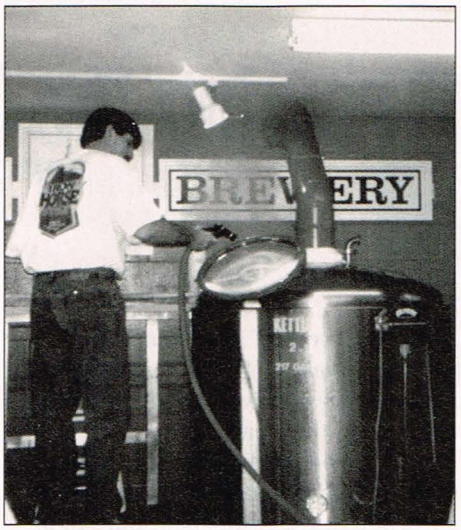
The First Time

On the first brew day the activity in the brewery was kinetic. A table in the middle of the floor was cluttered with laboratory equipment. Bryant moved between the brewhouse and a computer, entering a stream of information onto a spreadsheet.

One of the volunteers who was on hand for the first brew recalls, "The smell in the kitchen during a batch of homebrew is always a treat, but this amplified that 100 times. The nutty aroma of the malt mixed with the pungency of the hops was almost overwhelming."

With the first batch came the first boilover. "It's refreshing to know that stuff happens even on the grand scale," says the volunteer.

"I want my beers to be complex," says Bryant. "I want people to be able to experience a variety of tastes with each glass. In that way they're sure to find something about the beer that they like."



Bryant engages in a little preventive maintenance on his first batch — boilover control.

Still, the first brew presented some challenges. "There were some problems," admits Bryant. "We had trouble with the solar hot liquor tanks, but we got around that. We had a mash-in water temperature problem, but we solved that by heating the mash water in the kettle like you would do with a small system."

The Beach Tale Brown had a light but nutty taste with a good dose of hops. Eventually, it will become one of the brewery's standard brews. He also plans to brew Helles Gold Ale and several specialty brews, including pumpkin ale, heather ale, a wheat beer, and a Christmas brew.

217-Gallon Batches

A typical batch at Dunedin will require anywhere from 400 to 550 pounds of grain, depending on the type of brew in production. For the first brew Bryant used about 150 pounds more than that, because he simply multiplied the amount he would have used for a five-gallon homebrew. But he didn't take into account the better equipment he was using as a commercial brewer.

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"With the first batch the mash tun was so efficient that we came out with about 8 percent beer," says Bryant. A recipe used at home may have a mashing efficiency — the percentage of fermentable material extracted from the grain and thus added to the wort — of 67 percent under the best conditions. The same recipe used in the microbrewery with better, more efficient equipment and more controllable brewing conditions can have a mashing efficiency of 82 percent or better.

"We're playing with the amount of grains because we want to keep a lot of taste in the beer," says Bryant. "We have to mash in at a higher temperature so we won't get as many fermentables and we won't get as much alcohol, but we'll still have a lot of flavor."

Instead of opening little packets to add an ounce or two of hops to his homebrew, Bryant now dumps six to seven pounds of hops into each brew. He prefers hop pellets in this process to avoid clogging the small pipe lines, which can occur with whole-leaf hops. He also uses 380 gallons of water per brew and one liter of liquid yeast for each barrel.

Helles Gold Ale
(all-grain, 5 gallons)

Ingredients:

- 10 lb. American 2-row malt
- 8 oz. Belgian wheat
- 0.5 oz. Hallertauer hops (3.2% alpha acid)
- 0.5 oz. Tettnanger hops (3.6% alpha
- 1.5 oz. Saaz hops (4.4% alpha)
- 0.5 oz. Hallertauer Hersbrucker (4.0% alpha)
- 1 tsp. Irish Moss
- Wyeast 1007 German ale yeast (no starter)

Step by Step:

Adjust mash water to 5.2 pH. Mash at 154° F for one hour or until starch conversion. Adjust sparge water to 5.2 pH. Sparge until 6.5 gals. are collected or original gravity is 1.018.

Bring wort to a rolling boil. Total boiling time will be 90 minutes. Add Hallertauer and 1 oz. Saaz hops at boil. Boil 50 minutes. Add Tettnanger and Hersbrucker hops and boil 20 minutes more. Add Irish moss and boil 17 minutes more. Add remaining Saaz hops and boil three minutes more. Let it stand until the wort temperature is under 200° F. Whirlpool for 30 seconds. Obtain cold break through counterflow chilling. Adjust outlet temperature to 68° F into the fermenter.

Pitch yeast at 68° F. Rack to secondary fermenter after seven days. Drop temperature to 36° F. Keg in 5 gal. kegs. Force carbonate and hold at 38° F for 24 hours. Drop pressure to serving pressure.

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He estimates the direct cost of a batch at this level at $200 to $300. Indirect costs, factoring in everything from rental space to electricity, fall in the $800 to $900 range.

A Homebrewer at Heart

The whole brewing process is not that much different than what Bryant did as a homebrewer. After the cracked grain is brought into the brewery, it's dumped in a small hopper. It's drawn into the mash tun by a grain auger. The mash is heated, recirculated until it clears, then piped into the kettle for boiling.

After the boil the wort is pumped through a heat exchanger to cool it. Next it's moved into fermenters, where the yeast has already been pitched. Oxygen is added into the wort before fermentation to make up for the loss during the boil. After seven days or so in the fermenter, the beer is piped into holding tanks in the cooler before kegging.

Most of Dunedin's ingredients are supplied by The Brew Shack, a homebrew supply shop in Tampa, Fla. "Working with a homebrew store for my supplies assures me of fresh materials. I can also get whatever I need at a moment's notice," says Bryant.

"We have hop guys trying to sell direct, we have yeast guys trying to sell direct, we have grain guys selling to the brewery. That's good if you, as the owner of the brewery, are an expert in all things brewing," he says.

"While microbreweries are on the leading edge of the equipment field, a homebrew store is on the leading edge of brewing innovations because it is exposed to homebrewers, who are the leading edge as far as brewing science goes. They are the risk takers. I did a pumpkin ale and other experiments as a homebrewer. You start talking to someone about doing a pumpkin ale on a 30-barrel system and they're going to decide to use a little essence of pumpkin and put it in the serving tanks. That's not leading-edge technology."

Bryant also likes the free advice. "If you call individual manufacturers, they will recommend their own products. I want to know what's the best. At a shop where you have a relationship, you'll get the best you can."

Another reason Bryant shops at a smaller retailer is the special attention. "When we go to a big maltster, we're small; we're bottom of the barrel. With John at The Brew Shack, we're the big guys. Everyone else he sells to is a homebrewer," says Bryant.

To Market, To Market

Perhaps one of the most frustrating things about not having a distributor was the fact that people wanted the beer. During the early stages of the project, marketing had been by word of mouth. A few articles about the brewery appeared in some local publications, and the brewery had a float in two local parades.

According to Bryant, many of the local restaurants and pubs were anxious to begin serving the brewery's products. He was even approached by

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CREAM ALE

A quick and easy Summer recipe that tastes great after only a couple of weeks in the bottle and is even light enough for your commercial beer drinking friends. Hop bitterness is provided in the Original Draught kit which means the amount of time you will spend at the stove should be less than half an hour (culture the liquid yeast up to 500ml if time allows).

This beer tends to mature very quickly and may be ready to drink in as little as 1 week.

Ingredients:
1 x 4lb EDME Microbrewery Series ORIGINAL DRAUGHT kit
1 x 3.3lb Microbrewery Series LIGHT Malt Extract
1/2 teaspoon Irish Moss
1/2 oz. Cascade hop pellets (8 minutes)

Recommended Yeast: Wyeast #1084 or EDME Active Dried Yeast

For 5 gallons: Bring malts to a boil in approximately 1 1/2 gallons of water. Immediately add Irish Moss finings.
Your total boiling time will be 15 minutes.
With 8 minutes remaining, add hop pellets.
Strain the wort into a fermenter; top to 5 gallons with COLD water. Cool to between 65F and 75F, pitch yeast.

Optional: rack to a secondary fermenter after 3 days. Prime and bottle with 3/4 cup of corn sugar when FG is reached.

OG: 1.041, FG: 1.011 ± 0.001

OLD LONDON PORTER

A rich bitter/sweet Porter – a little heavier than you might expect!

Ingredients:
1 x 4lb EDME Microbrewery Series EXTRA STOUT kit
1 x 3.3lb can EDME Microbrewery Series DARK Malt Extract
1/4lb Chocolate Malt
1/4lb Crystal Malt
1/4lb Black Patent Malt
1/2 teaspoon Irish Moss
1/2 oz Fuggles hop pellets
Recommended Yeast: Wyeast #1028 London Ale or EDME Active Dried Yeast

For 5 gallons: If using Wyeast, start culture in advance (follow package directions).
Crack the Chocolate, Crystal and Black Malts, steep in 2 gallons hot water for 15 minutes.
Remove grains. Add Extra Stout kit, Dark Malt Extract and Irish Moss. Stir until dissolved.
Return to heat, bring to a boil and boil for 5 minutes.
Add Fuggles hop pellets and boil for an additional 5 minutes.
Strain the wort into a fermenter, top to 5 gallons with COLD water.
Cool to between 65F and 75F. Pitch yeast, ferment, then bottle or keg with 3/4 cup of corn sugar when final gravity is reached.

Optional: rack to a secondary fermenter after 3 to 4 days.

OG: 1.055, FG: 1.022 ± 0.002

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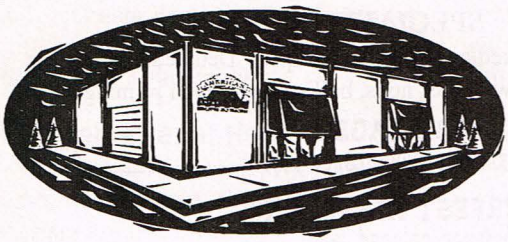
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a few potential clients for contract brewing — and all this before the first pint was even brewed.

But Dunedin did find a home for its first beer: The Scottish Highland Games. "It's legal in Florida to give away beer to non-profit organizations. We hosted the VIP tent at the Scottish Highland Games. It cost $700, and we got our name in all the advertisements and on all the fliers and banners. You can't always get exposure like that, particularly since we want to market the beer to this community," says Bryant.

"The community's acceptance and enthusiasm for the brewery is profit in itself," he adds. "With the city's name on the logo, it's almost like it belongs to the people and I'm just the caretaker. I really enjoy that."

That Pesky Distribution

Four months after brewing that first Beach Tale Brown, Bryant still hadn't found a distributor to sell it. He brewed a few batches, donating the first to the games and using the process on the others to attract the public for brewery tours, which Bryant considers good marketing. "Because it is a side business for me, we could afford to have everything ready to go without being able to sell," he says.

Just as things looked most bleak, Bryant found a distributor. More precisely, he created one. "The man who owns our building was really impressed with how we put it all together. He decided to get his distributor's license. In the meantime we found no one else to distribute, so we were able to wait for him," says Bryant.

"In my mind," he says, "I wanted to open a microbrewery, so I was going to do it. I knew I'd get there, it was just a matter of time. There's a lot to do; it's really a lifestyle change. You have to be mechanically inclined, you have to see things three dimensionally, you have to be able to stay with it. But it's worth it. You don't make a tremendous amount of money, but you don't need a tremendous amount of money when you have that kind of energy. When people consume your product, they smile. That's the most satisfying thing."

What I Learned in College

by Susan Walton

Dear Mom, College is great. I like all my classes a lot. Please send money for books, hops, a carboy...

When parents send their kids away to college, they want them to get a good, well-rounded education. At Wesleyan University in Middletown, Conn., this includes a basic knowledge of homebrewing and the Principles of Papazian.

As a college senior, Chris Asher organized and taught Homebrew 101 to 10 determined students. The students learned the basics of homebrewing and brewed four batches of beer. They got full credit for the course, too, even though it was held in Asher's kitchen. "We wanted a classroom, but I think (the administration) thought we'd make too big a mess," Asher notes.

When Asher was a freshman, a roommate taught him how to brew. He brewed in dorm rooms and apartments for the next three years. He answered so many questions about his hobby from the curious over the years that he felt certain there was enough interest around campus to fill a class. And he wanted to teach it.



Brewing-class clown Toby Koffman shows fellow-student Drew Levine how to check a Cornelius keg for leaks.

Truly Scientific

"At first there were about 25 people who wanted to be in the class, but there wasn't room for that many in my kitchen. So I kind of put them off, and the people who really hounded me got to be in the class," Asher admits.

While the enrollment process may hae been a bit unusual, the school had some more stringent requirements that had to be met.

Asher was required to turn in a syllabus and lesson plans before the class started. He was assigned a faculty adviser, chemistry professor Albert Fry, to help him through the process.

Asher and Fry established a curriculum that divided the semester into four sections, focusing on four batches. The first and second batches were recipes that Asher assigned. They were simple extract brews with easy measurements that would introduce the new brewers to the basics such as fermentation and sanitation.

The third assignment was to produce a special recipe by modifying one from their textbook. "I would help if they asked, but I tried to get students to work it out on their own," he says. The fourth and final batch was a recipe of student's choosing.

Required course material for each student was a kit that included all the necessary equipment (minus a brewpot) for $40, *The New Complete Joy of Homebrewing* by Charlie Papazian ($10), and $60 for the ingredients to make four batches. Asher was able to buy all the ingredients in bulk to keep the cost down.

The students paired up to share brewpots and brewing sessions.

Throughout the semester each team kept brewing notebooks, which were turned in to the professor at the end of the course. These included class notes, recipes, and brewing notes from the four batches. They also turned in a five-page paper about brewing and calculated the International Bitterness Units, alcohol content, and specific gravity of their final batch.

Someone's In the Kitchen

Asher's kitchen classes were a mixture of lessons and demonstration combined with assigned reading. "With the demonstrations I wanted to inform people about stuff that isn't in the books, like turning the heat off before adding extract to avoid boilovers," he says. He taught the class about mashing, as he is an all-grain brewer, but the students didn't actually do a mash. Some days he discussed the reading, while other days were designated labs, such as the day he did a sparging demonstration.

The high points of the semester were the class trips. One was to the New Haven Brewing Co. for a beer tasting, and another was to the Farmington River Brewery. That trip included a full tour and history of the brewery. Asher enthuses, "It was great! Bill Hodkin, the brewmaster and owner, showed us all his equipment and told us the story behind each piece, how he traveled all over the country to find it. He showed us how it all worked, and we learned a lot."

One of the unexpected side effects of the class was the creativity it generated. Some students went out of their way to find unusual fruits and flavors to use with their beer, such as Dan Schaefer's "Black Star Ale," which used star fruit. When Tori Peglar and Sarah Huard needed

Strawberry Swheat
(all-grain, 6 gallons)

Ingredients:

- 8 lbs. American malted wheat
- 4.5 lbs. Belgian Munich
- 1 tsp. gypsum
- 1/2 tsp. salt
- 1.25 oz. Cascade hops
- 3 lbs. fresh strawberries
- Irish ale yeast
- 3/4 cup priming sugar

Step by Step:

Mash malts, salt, and gypsum at 154° F for 60 minutes. Use 4 gals. of water in the mash. Sparge and collect 6.5 gals. of wort. Bring wort to a boil, add 1 oz. hops, and boil for 40 minutes. Add 0.25 oz. hops and strawberries and boil for 20 minutes more. Remove from heat and cool wort to 70° F. Pitch ale yeast. After primary fermentation rack beer into secondary, hold for seven days, and bottle.

— Chris Asher

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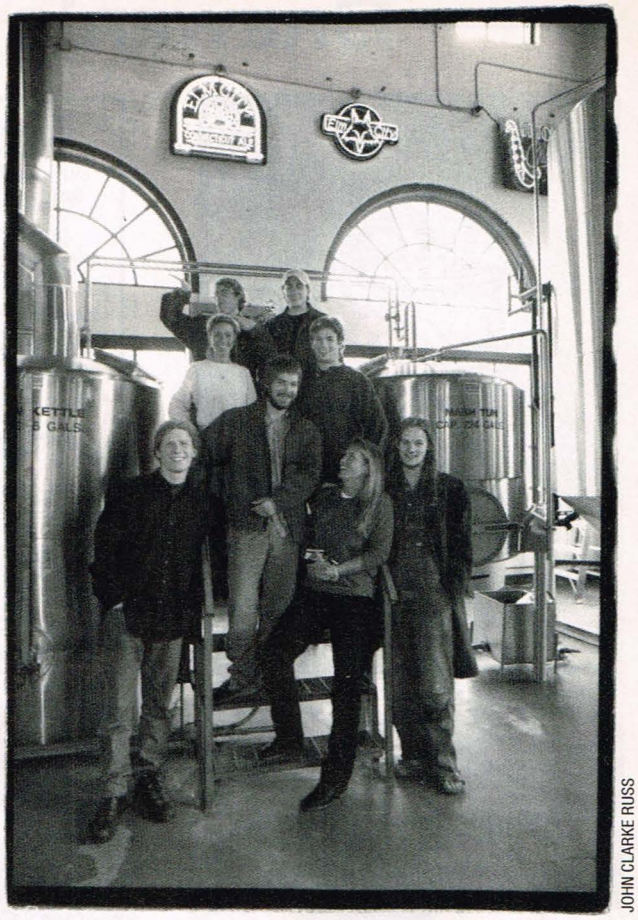
bottles to put their homework in, they held a "Bring a Full and Leave an Empty" champagne party at their house.

In assigning recipes to students, Asher used a basic formulation and changed some of the amounts and ingredients for each brewing pair. "I tried to make it a controlled experiment, varying the things like crystal malt and hops so the students could see the differences it made in the beers. It worked well. At the tastings they were able to identify all sorts of different flavors — ones that should be there and ones that shouldn't."

Group tastings where everyone analyzed the beer according to the differences in the recipe gave way to the end-of-semester tasting, which took the form of a contest featuring the students' final projects as the entries.

A Dream Final

"We started out with a 10-point scale, but the more we tasted the less we paid attention to it," Asher



JOHN CLARKE RUSS

A class trip to the New Haven Brewing Co. provided a great opportunity for tasting and a behind-the-scenes look at the brewery. Clockwise from top left: Matt Way, Dan Shaeffer, Chris Asher, Anson Birtch, Sarah Huard, Toby Loffman, Rob Thompson, Tori Peglar.

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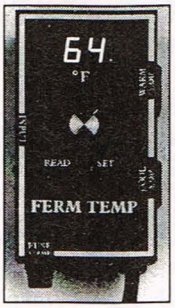
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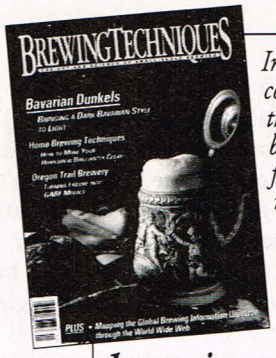
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(extract, 5 gallons)

Ingredients:

- 6.6 lb. malt extract (dark)
- 0.75 lb. crystal malt
- 0.5 lb. roasted malt
- 0.5 lb. black malt
- 2.5 oz. Centennial hops
- 1 lb. oatmeal (Quaker Oats, e.g.)
- Yeast
- 3/4 cup corn sugar (for priming)

Step by Step:

Steep oats and malts in 155° F water for 15 minutes. Sparge. Add extract. Start boil with 1 oz. hops. Boil 45 minutes, add 1 oz. hops, and boil 12 minutes more. Add 0.5 oz. hops, boil three minutes more. Lower temperature to 70° F and pitch yeast. Bottle with corn sugar.

— Jamie Chester and Greg Pederson

admitted. Everyone had a great time tasting their classmates' brews.

One popular brew was Peglar and Huard's Dingleberry Ale. "We weren't sure if it was going to get contaminated when we added the raspberries four days into the fermentation process, but everything went smoothly," said Peglar. "It turned out to be one of the more popular brews at the tasting, which was pretty exciting for us beginning brewers."

The Mocha Java Porter took high honors as the unofficial winner at the tasting with kudos also going to the instructor's own "Strawberry Swheat" and Jamie Chesler and Greg Pederson's "Sow Your Wild Oats Stout."

Eventually on the day of the contest, the class threw open the doors and made it a campus-wide homebrew bash. Everyone had their fill of beer, and there was still some left over. The bash went a long way toward generating interest in the class, which may be held again next year. Bill Hodkin of the Farmington River Brewery expressed interest in teaching it, since Asher has graduated.

Hodkin, a graduate of the University of California, Davis, Brewing Science program, was excited about the class and its potential value. He thought the students were getting an excellent introduction to brewing and the science principles involved. "They are some of the best-educated brewers I've met," he said.

Even though many on campus thought the class was a classic example of a senior gut course, the students defended its importance. "It isn't vigorously academic, but it is something that is useful, which is rare," said senior Eve Crowell, whose signature was "Eve's Evil Ale," a pale ale.

As many homebrewers can attest, brewing takes concentration, planning, and patience, and while it may not be pre-med, there is plenty to learn. ■

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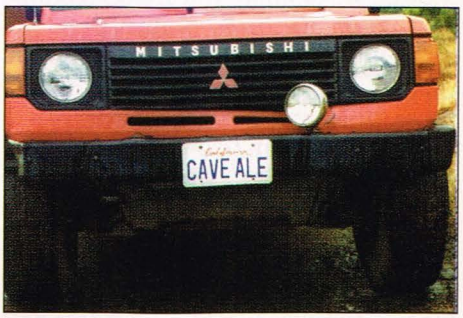
Great Beer, Awesome View

by Steve Johnson

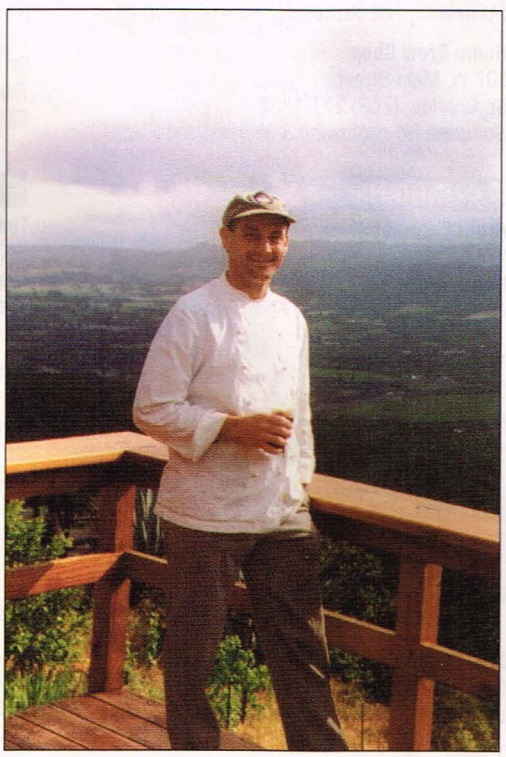
Humes Brewing specializes in organic beer — and a spectacular vista.

Humes Brewing is definitely not "just another microbrewery." Even in a column that features unusual breweries, Humes is in a class by itself. That's because brewer Peter Humes produces all of his beers with organic ingredients.

Don't get me wrong, there are other breweries producing organic brands, including Brauerei Pinkus Müller in Germany, New Caledonia in Scotland, and Jade in France. There is also Perry's Majestic, brewed under contract in the US. The difference between these breweries and Humes is that they produce only one organic beer apiece, whereas Humes produces all five of his beers using organic ingredients. Not only that, Humes' beers are made with spring water and are unfiltered, bottle conditioned, sometimes aged in wood, and until recently, hand bottled. Besides being 100 percent organic, they also taste delicious. What else could you ask for?



Peter Humes gets some free advertising from the personalized plates on his four-wheel-drive.



STEVE JOHNSON PHOTOS

Peter Humes enjoys a beer in the "eagles nest" overlooking the Valley of the Moon.

Well, how about the most spectacular view offered by any brewery in the country? That's right, Humes tops the brewery-with-a-view list. And the list is impressive: the view of the Kennebunk River in Maine, as seen from the deck of Federal Jack's, the restaurant just above Kennebunkport Brewing; the view of Victoria Harbor from Spinnakers Brewpub in Victoria, British Columbia; the view of the Columbia River Gorge from the White Cap Brewpub in Hood River, Ore.; the view of Government Cut, the main shipping channel into Biscayne Bay (the ships pass almost within a stone's throw of the brewpub) from the South Pointe Seafood House & Brewing in Miami, Fla.; a lovely view of the mountains from the picture window in the back of Anderson Valley Brewing in Boonville, Calif.; a dazzling vista of the San Francisco Bay from the second floor at Gordon Biersch Brewing in San Francisco; a lovely view of Lake Tahoe from the Blue Water Brewing in Tahoe City, Calif.; a beautiful view of the snow-capped Cascades at the Deschutes Brewery (a microbrewery) in Bend, Ore.

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But Humes Brewing takes the prize with its eagle's nest perch near the top of a steep ridge running between the Napa Valley and the Valley of the Moon in California. And it is a real adventure to visit.

Visitors have no idea what is in store for them as they start up Cavedale Road. The single-lane road clings to the side of the mountain as it twists and turns its way toward the top. Visitors pass a few stucco houses while rising quickly out of the vineyards into the chaparral. If luck is not heading their way, they are likely to find themselves face to face with a school bus on the side of a brushy cliff. It can take 15 minutes to traverse 2.5 miles from the bottom of the hill to Humes' brewery — a house with a red barn behind it (actually, there is no "behind"; the barn is above the house).

Humes has built a balcony on the brewery that hangs out over the Valley of the Moon, offering a breathtaking view of world-famous vineyards more than a thousand feet below. A beer on this deck is definitely worth the trip, regardless of where you live.

The brewery has been a secret until now. The only people who seem to know about Cavedale Road are the locals and mountain bikers. The road got its name from the fact that soon after it was built around 1905, locals dug caves into the side of the hill to store wine from nearby wineries. Some of these caves are still visible along the side of the road.



Humes Brewing's Old Hophead Barleywine is stored in French oak casks.

Like so many others, Peter Humes' brewery just sort of happened. Before moving to California, Humes was a chef on the East Coast, where he owned and operated two restaurants in succession.

After leaving New York Humes and his wife discovered California while on their way to visit friends in Washington state. They were so impressed with the spectacular scenery and northern California lifestyle that they stayed in California, never making it to Washington. They both began working as chefs in local restaurants and wineries and also opened a catering business. Peter began dabbling in home wine and beer making and with his background in organic food, he eventually put two and two together: organic beer. His goal was to make beer that would both be completely organic and taste better.

With limited resources and no idea how well his idea would work, Humes in 1993 began putting together a brewery. His total investment was $20,000. All of the funds came from personal savings.

He used primarily converted dairy equipment. He had a local company cut a stainless-steel water tank in two and converted the two halves into a mash tun and a brew kettle. He uses six-barrel, glycol-jacketed primary and secondary fermenters. He purchased a new Little Tiger roller mill from Hutchinson Manufacturing in Kansas. A milk strainer was pressed into service as a hop back. Humes did much of the plumbing and carpentry work himself.

At first the beers were unfiltered and hand filled into either 750-milliliter champagne bottles (using a wine-bottle filler) or into kegs. Despite his limited budget, Humes had the Humes Brewing brand name silk-screened in gold lettering and baked on the bottles at 600° F. He jokes, "That is an expensive way to sterilize the bottles."

Humes says that from the time he began putting his brewery together, it took only five months to go into production. For the first two years it was a one-man operation, with Humes making, packaging, and delivering the beer.

In the first year Humes produced 218 barrels and almost doubled that the second year with 408 barrels. Production for the third year is on target for 660 barrels. Despite the higher price he charges and the added burden to the customers of having to return the bottles, Humes' beers are selling very well, particularly at organic food stores. Despite the almost microscopic production, Humes beers are now available in California, Connecticut, Illinois, Kentucky, Massachusetts, Michigan, and North Carolina.

Based on his initial success, Humes in 1995 invested another $40,000 in the brewery. A cold room, several 12-barrel fermenters, and a second-hand, automated wine-bottle filler were added.

To raise the capital Humes came up with a simple, though risky, scheme. First he checked in with the commercial loan departments of several local banks. They required a lot of paperwork. Then Humes noticed that many banks were offering new credit cards with generous credit lines at an introductory annual interest rate of only 6.5 percent. Humes was amazed when he realized this rate was lower then the commercial loan rate, and there was almost no paperwork or waiting. The catch was that all credit had to be paid off within one year, or the interest rate increased by about 250 percent. He decided to go the credit-card route and says that so far he is on schedule to have the $40,000 paid back within the first year.

With growth Humes has had to modify production and distribution. He has three workers who come in once a week to bottle the beer. Also, he has given up self-distribution. These changes have allowed Humes to concentrate on the important thing — making organic beer.

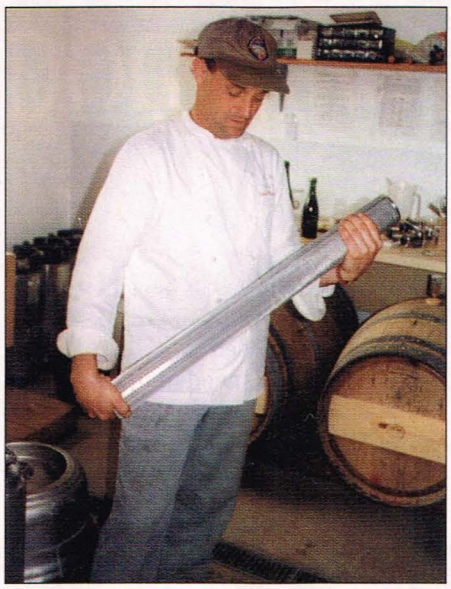
So what does "organic beer" really mean? To the consumer it means that

the beer is made using certified, organically grown malts and hops — no pesticides or chemical fertilizers were used in the growing and packaging of the malt and hops. Also, the water, which accounts for about 94 percent percent of the beer, comes from a spring that has been certified free of chemicals.

To the brewer "organic" means the ingredients can only come from certain sources and cost twice as much as non-organic ingredients. The spring water is double filtered to ensure purity. Two-row, organic malts are purchased from the Bioriginal Food & Science Corp. in Saskatoon, Canada.

Organic hops include whole organic Cluster, grown on a hop farm near Sacramento. From Germany come Hersbrucker and Tradition, both pellets. From New Zealand come Pacific Gem and Hallertauer, also in pellets. Humes has also used organic Pride of Ringwood from Tasmania. He says that due to the differing harvest times in the Northern and Southern hemispheres, he receives fresh hops every six months instead of once a year as other brewers do. To maintain freshness the hops are stored under a layer of nitrogen gas.

The beers are unfiltered to maintain the original full flavor and nutritional value, kraeusened (fresh wort is added in the secondary fermenter), and then bottle conditioned to produce natural carbonation.



Much of Humes' equipment, such as this hop strainer, is converted from dairy equipment.

Humes' lineup includes Cavedale Ale (original gravity 1.048, final gravity 1.008, 5 percent alcohol by volume), a saisons or Belgian pilsner style. It is a deep, cloudy gold with an enticing aroma of fresh strawberries and malt. Malty in the middle, it finishes long, tangy, and bitter.

The Jaipur Pale Ale (OG 1.062, FG 1.012, 6 percent alcohol by volume) is dry hopped, as many IPAs are, and is a much hoppier version of the Cavedale Ale.

The Steep Canyon Stout (OG 1.055, FG 1.010, 5.5 percent alcohol by volume) is jet black with a tall, brown head with a creamy top that leaves good lace on the glass. The body is full and silky and the palate rich with deeply roasted malt, notes of chocolate and coffee, and firmly balanced with fresh hops.

Because distribution is rather limited in each state, if you can't find Humes beers in the states listed above, you might want to contact the brewery to find out exactly where it is available. If you are in the Sonoma area and would like a tour, call the brewery at (707) 935-0723 for an appointment and directions. Please remember, besides operating the brewery, Humes has a regular job and it might be difficult to fit a tour into his busy schedule. ■

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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Tales of a True Brew Klutz

by James Slaton

I was told once if you can read and boil water, you can make homebrewed beer.

A dozen ruined batches later, I feel pretty stupid.

What were intended to be words of encouragement now hang heavy like 12 rotting albatrosses around my neck. I know I can read and I'm pretty sure I've gotten the knack of boiling water, so what's the hold up?

The problem began nearly four years ago when I received a homebrew kit for my birthday. What a gift, I thought — unassembled beer. It was like getting a ball of yarn and a couple of knitting needles in place of a sweater.

But, as the saying goes, don't look a crappy gift in the mouth. When the world gives you lemons, make beer.

The first batch was predictably bad. It was sour, bitter, skunky, cidery — there are a host of adjectives brewers use to describe beer as bad as my first. I don't know what any of them mean, but I know they're not complimentary.

The bad batch would not have been a problem if beer were brewed by the glass. A pint of sour brew? Just pour it down the sink. But it isn't brewed by the glass, it's made by the five-gallon bucket. That's about 40 pounds of beer. You can't just pour five gallons of stinky beer down the sink. You have to call the Hazardous Materials Department.

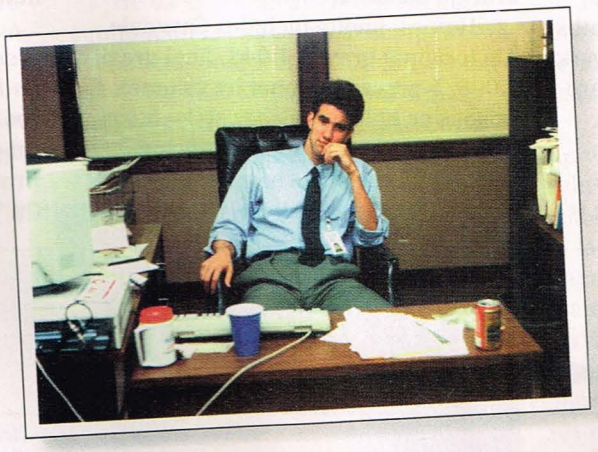
Also, keep in mind that the five gallons isn't all in one place. Before you taste it and know just how disgusting it is, you've already completed the painstaking task of separating it into about 50 bottles. And put caps on those bottles. And put those bottles in some dark corner of your house. And cleaned up the mess they made when five or six of them blew up. And buried your kid's pet that was killed in the explosion.

It takes a long time to pop open more than two cases of beer bottles, especially when you can't drink any.

But you get used to it. I have. HazMat is on my speed dial.

Since that first batch, I have learned enough about brewing to be able to isolate exactly what went wrong in each consecutive batch. If one can learn from mistakes, I must be one of the most knowledgeable brewers around.

There was the one batch that I let sit out by my window. The sun's UV rays soured it. Then there was the one ruined because a cold snap sent the yeast into shock and stopped the beer's fermentation. I was told that one tasted like detergent. One was contaminated when I dunked my hands in the beer to retrieve a strainer I dropped. The worst was the one where the airlock became blocked and blew the top off my carboy. The list goes on.



Wild yeast contamination, sanitation problems, exploding equipment. To James Slaton, it's just an average brewday.

Not that I haven't had a few batches that worked properly. There were Super Funky Crud, Nicole's Revenge, Tarbaby Stout, and others, but what did I learn from them? And to be honest, even several of those were products of accident, if not error.

Super Funky Crud was a beer that defied expectations. Although it turned out to be a fine brown ale, I was following a recipe for a stout. SFC earned its name while being strained into my fermenter. The filter I was using became so stopped up with hop pellet muck that I had to scoop it out every 30 seconds and slop it into another container on the floor.

I don't filter a damn thing these days. If I've learned anything, it's that the less involvement I have with the beer, the greater its chances of survival.

I don't let my few successes spoil me. I find other ways to screw up my brew. I don't want to give away any trade secrets, but I'll give you a hint about my latest technique to contaminate beer — chilling the wort. I've tried some dumb things, but I'll let you use your imagination.

Don't get me wrong, I love brewing. Despite my repeated and humiliating failures, I enjoy few things more than cooking up a mess of beer. And I mean "mess" literally.

I find brewing to be one of the most relaxing things in my life. I know it's probably going to come out tasting like an old gym sock, so there's none of that silly pressure about the quality of the final product; just the soothing mindlessness of throwing a bunch of leaves, grains, syrups, and powders into a boiling pot and stirring. That's all there is to it.

If it tastes bad, there's always a six-pack of Anchor Steam at the supermarket. If it's good, well, you've got five gallons of beer at your disposal that you paid for so long ago it tastes free.

And free beer is enough to keep me coming back for more. ■

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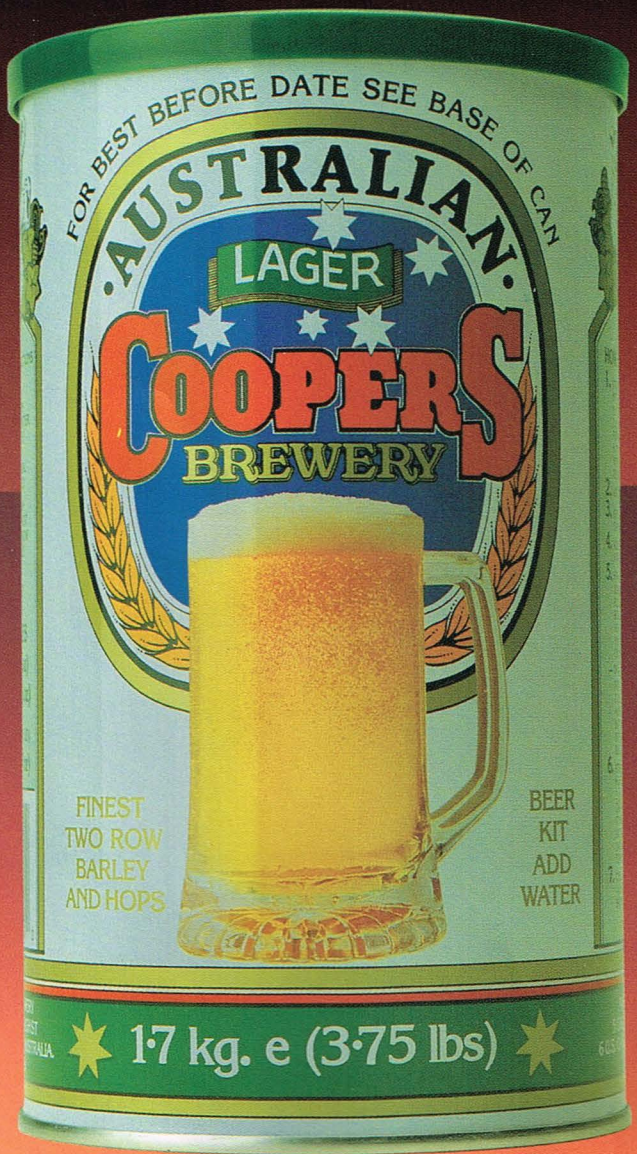
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