April 1997, Vol.3, No.4
Niche Publications Inc.

Brew Your Own

THE HOW-TO HOMEBREW BEER

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Killer Recipes: Bread From Spent Grains

Style of the Month: American Pale Ale

Conquering Chill Haze

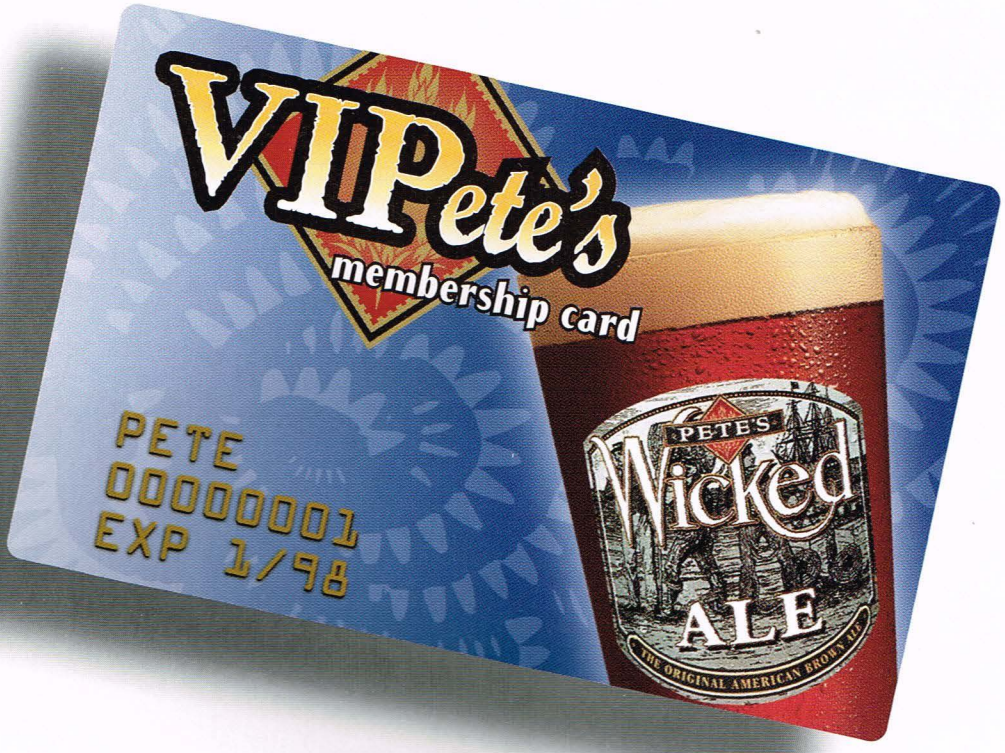
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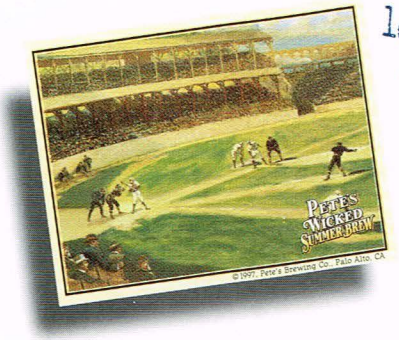
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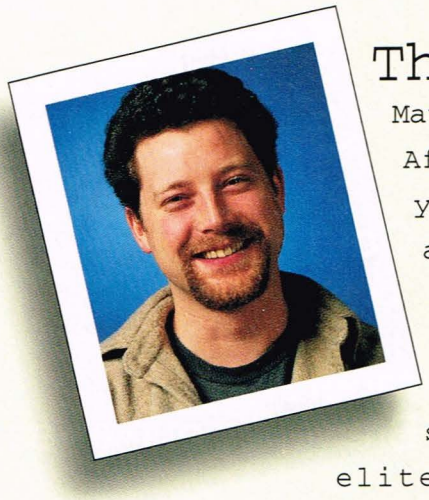


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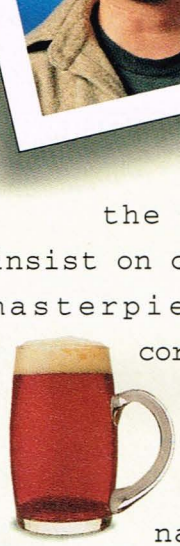
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This is Sean. He's our beer guy.



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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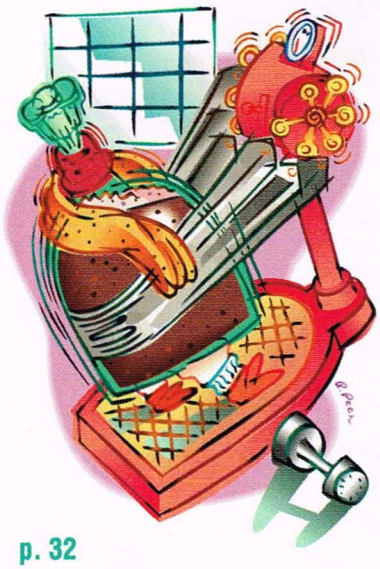
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Cover photo: Kent Lacin

The Easy Beer Diet

Maybe you've heard this before, but it was new to me. I recently read that you can actually lose weight by eating celery.

I'm not much into dieting but you have to admit, this is an interesting fact. One average-size stalk of celery provides about five calories; I looked it up. That means the chewing action burns, let's say, six calories. Presumably the less ripe, and therefore more tough, the celery is, the more weight you lose by eating it.

The next time someone mentions the 25 grams of fat in my frosted chocolate donut (cakey, not puffy) or the 1,500 calories in that wafer-thin sliver of chocolate mousse torte, I'll hit them with the facts: It's okay. I had 30 stalks of celery for lunch. I earned it.

This new diet approach has possibilities.

Naturally, this got me thinking about beer. When I'm having a beer or two, what are some of the things I could do to, let's say, minimize the impact — short of switching to Bloody Marys. I started to make a list.

• Drink out of only heavy glass mugs. If chewing celery burns six calories, the right mug has easily got to kill off three or four per hoist. Maybe more if you use those giant German liter mugs. You can increase the benefit here if you follow point two:

• Sip, don't gulp. Subtract a half-calorie every time you pucker your lips and swallow. Our statisticians are still calculating the optimum number of sips per glass. This is a matter we want to study thoroughly.

• Drink from smaller glasses. The motion of pouring more has to be worth a few calories. And if you're in training, leave the bottle in the other room.

• Pour from smaller bottles. Same benefit as previous entry. Pass it along to your friends. You're still drinking from 22-ounce bottles? Haven't you seen the health study?

Right about here, while I was happily compiling my list, it hit me. This is all nickel and dime stuff. The big factor is homebrewing. Which do you think burns more calories: Getting into the car and driving to the corner store to pick up a six-pack, or waging war against a stubborn stuck sparge? Ordering another glass of whatever's new on tap, or starting a vigorous whirlpool?

Are you stressing out about getting your mash temperature right? It's okay, you're burning calories. Wort boiled over? You're burning twice — once while you rush to turn the heat down and again later on when you clean up that ugly mess. Have to carry that full carboy down to the basement? Burn, baby, burn!

On the other hand maybe there's an easier way. This month's cover feature examines how to control the alcohol content in beer. Author Kirk Fleming offers tips on brewing great beer with less buzz. There are lots of reasons a beer lover might want a lower-alcohol brew, and one of the side benefits is that less alcohol means fewer calories. Hey, you have to admit, it beats eating all that celery.

The story begins on page 32.

While we're on the subject of diets, something you might want to add to yours is spent-grain bread. That's right, you can make delicious and unique bread using the same grains you just used in that batch of Boffo Brown Ale or Ambient Amber. Author Dennis Midden is an expert with dough and grain. He shares his secrets beginning on page 38.



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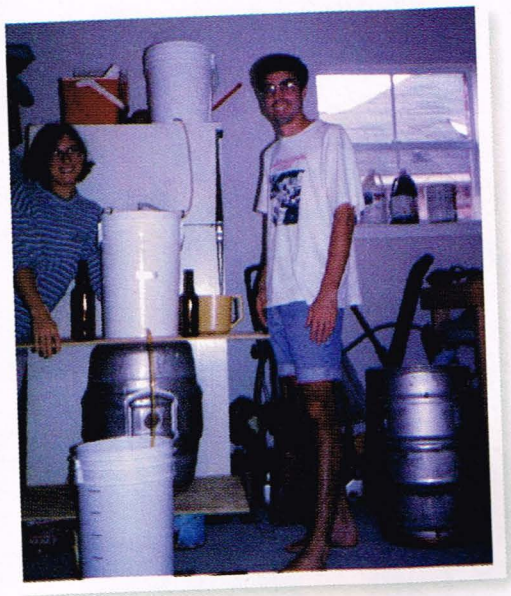
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Couples Who Brew



Although they share their all-grain experiences, friendly competition leads Monique and Brent to brew their partial-mash recipes apart.

Monique Jacobs and Brent Evans
Baton Rouge, La.

Brent and I both had about a year's worth of independent brewing experience under our belts when we met at a Baton Rouge Enzyme Wrights club brew function. It's been hoppy wishes and strong ale dreams ever since.

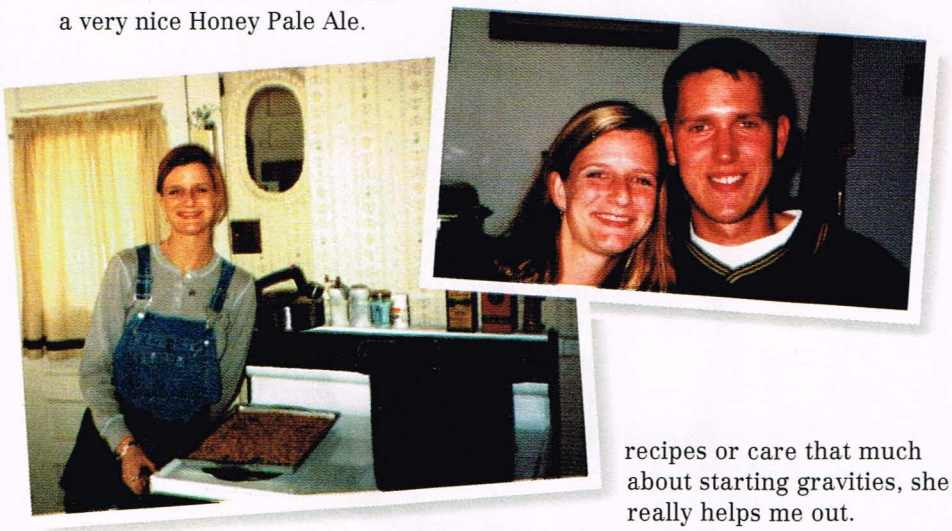
We both began our brewing using partial-mash kits. I started with the help of a friend who is an experienced brewer, and Brent started thanks to a birthday gift from his dad, who also brews.

About six months into my Magical Mystery Tour of Brewing, my mentor and I began all-graining. After hearing me yap about the wonders of all-grain brewing, Brent finally decided to invest in the equipment. We hooked up with another beer-brewing friend, who gave us a 15-gallon keg. We converted it and another keg we bought into brew pots, i.e. we had the tops cut off.

Although we brew our all-grain batches together, we both still dabble in partial-mash recipes. But when it comes to brewing those recipes, we choose to brew independently, both believing each of our ways is the right way — though I am unmistakably the better brewer.

Dan Linski
Plains, Pa.

I've been brewing about two years and have made a lot of good homebrew with the help of my honey, Sharon. Here she is posing by some toasted malt we used to make a very nice Honey Pale Ale.



Dan takes the lead as brewmaster when he and Sharon put the fire to the kettle.

As with many people who brew together, there is always one person who considers himself to be the brewmaster (me) and considers the other to be the apprentice (Sharon). Although Sharon doesn't formulate recipes or care that much about starting gravities, she really helps me out.

Sharon even joined our local homebrewing club, The Wyoming Valley Homebrewers, and has been to more club meetings than I have!

I would really like to thank Sharon for all her help and for staying up late on brewing night. Thanks, Honey.

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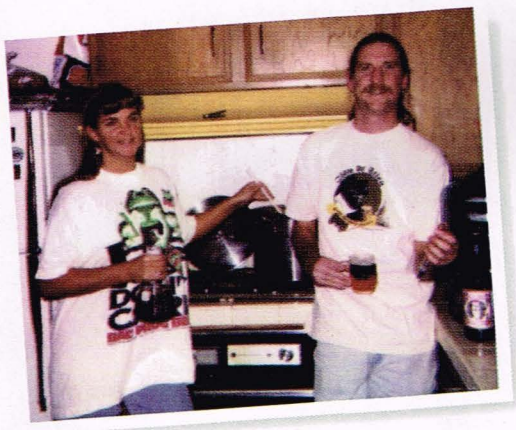
Photo - State of Michigan Travel Bureau

Stan and Vicki Singer
Simi Valley, Calif.

Here is a picture of my wife and me brewing a batch together on a cold December night. We have been brewing together for about a year. She was there for my very first batch, a nut brown ale called Brown Beaver Ale. We live on Beaver Street, hence Beaver Street Brewery and our first beer's name.

Since then we have brewed on average three batches a month. We bottle one batch a month and keg the rest. We do mini-mashes to cut our brewing time so we can brew more often. We usually have three or four beers on tap in an old converted fridge.

We even make our labels together. We have brewed and labeled such favorites as Armenian Mud (stout), Dog Breath, Dumb Blonde Ale, Dear Abbey, Bass Ackwards, and Red Raptor.



Husband-and-wife team Stan and Vicki brew three batches a month.

Keith Krasuski and Erin Bailey
Little Falls, N.Y.

I have been homebrewing for about a year. For my first anniversary of brewing I decided to try something special.

My girlfirend (of almost a year) helps me with the brewing process. Unfortunately she rarely samples the finished product. She promised me that if we made a wine together, she would drink it.

We decided to make a three-gallon batch of strawberry wine. It should be ready within the year, and we can't wait.



Erin helped Keith celebrate his one-year brewing anniversary by whipping up a batch of strawberry wine.

Rich and Meg Hoffmann
Inverness, Fla.

My wife, Meg, and I are definite "brewmates." We always brew and bottle beer together as a team. I get everything clean and ready while Meg stirs, pours, measures, and keeps time and measurements for all steps of the brewing process. We also enjoy the fruits of our labor together with a toast and clinking of our frosted, beer-filled mugs. Brewing and imbibing adds joy to our lives and helps keep us close to one another. We think that couples who "brew together" also...together!



Equality is the name of the game for Rich and Meg. They share brewing responsibilities and the fruits of their labor.

Forty Batches and Still Brewing

Two of my good friends brew together. Here is a photo of Laurie Arndt and Tim Norris proudly displaying their new 15-gallon brew kettle being used for the first time. Behind them along the fence, Cascade hop sprigs are appearing. The sprigs went on to produce a bountiful crop in autumn. Originally stovetop brewers, Laurie and Tim have brewed some 40-plus batches in just two years of homebrewing. What a team to be brewsome buddies with.

— David Busch
Spokane, Wash.



Brewing In Style!

What's the strangest outfit you've worn while brewing? Tell us about it and send us a picture. 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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3/4 oz Northern Brewer Hop Pellets (30 min) 7.3 IBU
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3/4 oz Northern Brewer Hops (in fermentor) 3.9 IBU
1 pint Wyeast #1968 Ale Yeast Starter
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Recipes created by:
Byron Burch

Byron Burch is a respected authority on beer, wine & meadmaking & author of 'Brewing Quality Beers' avaliable from all good Homebrew retailers.

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3/4 tsp Calcium Carbonate
1/4 tsp Calcium Chloride
1/2 oz Columbus Hop Pellets (60 min) 26 IBU
1/4 oz Northern Brewer Hop Pellets (60 min) 7.4 IBU
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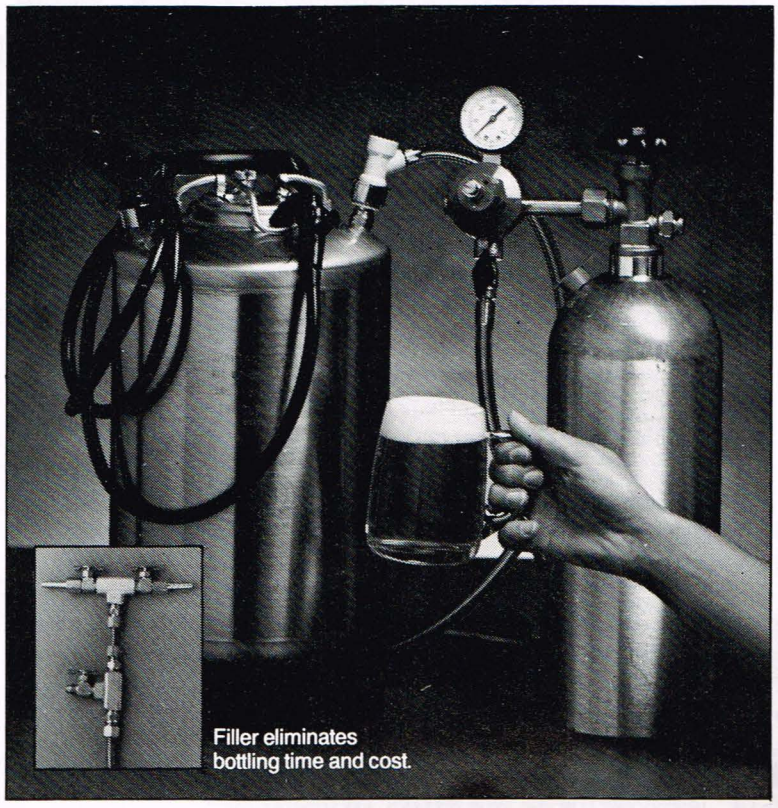
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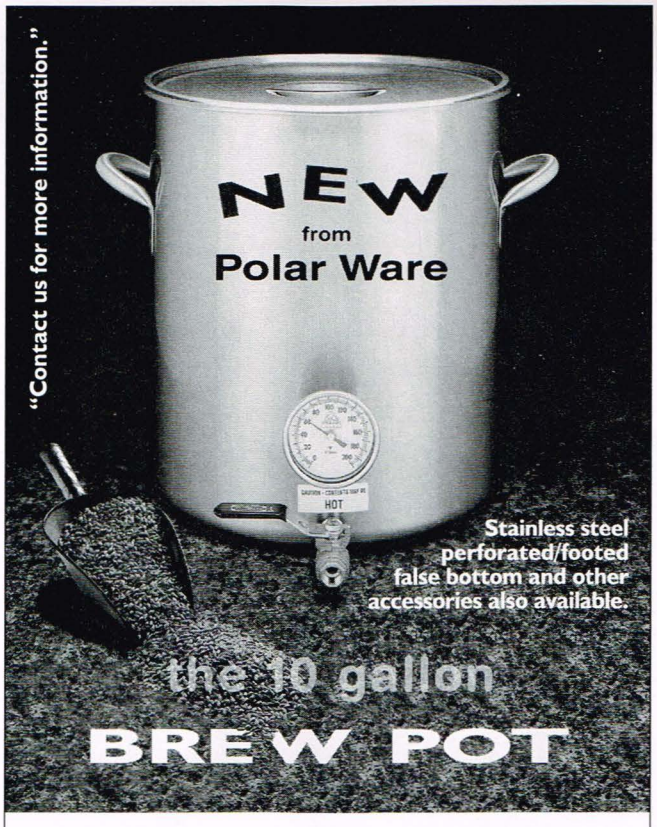
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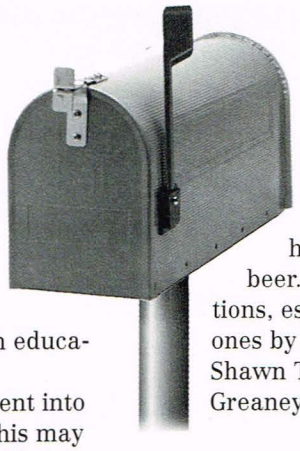
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Dear Brew Your Own,

I buy BYO at my local brew supply store and have been doing so for about six months. I love reading the magazine and have received an education doing so.

I just finished reading Descent into the Maltstrom (January '97). This may be the funniest article I ever read, not just the funniest brewing article but any article I ever read! More articles by Mr. Gallagher, please.

Ron Napierkowski
Erie, Pa.

Dear BYO,

I have been looking for an opportunity to encourage the people I work with to get into homebrewing. I work at a corn wet-milling plant in the refinery, where we use corn starch to produce fructose, dextrose, and maltose corn syrups.

After reading Explosive Brewing by Scott Keller (Pot Shots, December '96), I found a way to spark an interest in my fellow team members.

Keller wrote about how he dealt with the exploding bottles of beer in his basement and the types of safety equipment he used. I couldn't stop laughing. I was in charge of the safety meeting at work the next day.

I read this letter to all the workers, and when I came to each piece of safety equipment that he used, I put it on. In the end I was wearing a refrigerator box. When I was done, I received a standing ovation.

Although the talk was on focusing and using the right safety equipment for the job, the article worked.

By the end of the day, I was making photocopies of your subscription form, and many people were asking questions about homebrewing.

Tony Green
Bloomfield, Iowa

Dear BYO,

I usually read *BYO* cover to cover. I like the variety of features and the light, humorous tone. After all, we brew for fun, right? BYO has a good balance of that type of lightness and quality information. It's kind of like the balance between hops and malt in a great beer. I enjoy the illustrations, especially the wacky ones by illustrators such as Shawn Turner and Michael Greaney.

Steve Darnell
Ypsilanti, Mich.

Fatal Hops

Dear BYO,

It has come to my attention that brewers put their animals at risk when using hops. Dogs (as well as cats, pigs, and horses) are in jeopardy when we dispose of spent hops in compost piles or in the trash. Also hops in all forms, whether growing, dried, or spent, should be kept from away from animals.

When animals ingest hops it poses the risk of malignant hyperthermia, a life-threatening disorder that affects skeletal muscles. The condition can be triggered by stress or excitement in susceptible animals. Anesthetics are the most common trigger. Common signs are acute panting, restlessness, tenseness, pain, and flatulence.

Frances Besne
Orangevale, Calif.

When To Bottle

Dear BYO,

The word "bottle" does not appear in Lager: Pale Pilsner to Malty Munich (February '97). Many of us still bottle our homebrews. I was not clear at what point in the process to use "Cornys and picnic taps" for bottling.

Ed Ford
Tulsa, Okla.

When fermentation has finished at 45° F, cool fermenter to near 33° F and hold for three to four days to remove most of the yeast. Don't hold cold for too long, as some yeast is needed for carbonation. Rack beer to bottling bucket and add 1/2 to 3/4 cup sugar for each five gallons of beer, mix, and bottle. Store cool (45° to 55° F) for two to four weeks to "lager" the beer.

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- May 3: Orlando, Fla.; contact Mac Monroe, (407) 253-2534.

Additional test dates are planned for April in Boston and Rochester N.Y.; May in Chicago; Regina, Sask.; and New Albany, Ind.; October in Bellevue, Wash.; and later this year in Fresno, Calif.

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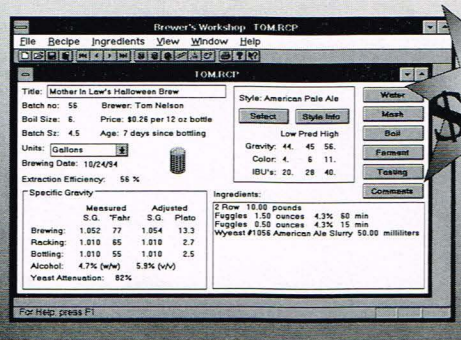
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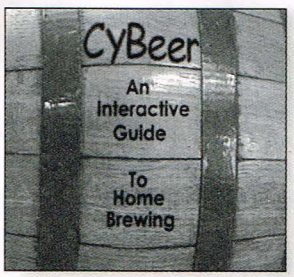
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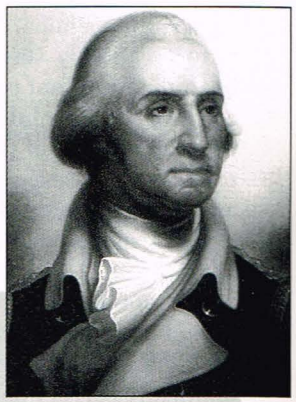
CIRCLE 35 ON READER SERVICE CARD

Sprucing Up an All-American Brew

by Scott R. Russell

This is the stuff that myths are made (or unmade) of. Take the American Revolution, for example. We know now (or we have re-learned, at least) that many of the founding fathers were homebrewers. Sam Adams, after all, was heir to a commercial brewery (which he apparently didn't want, but that's another story). Thomas Jefferson made beer, Paul Revere made mead, and of course we are led to suspect that what Patrick Henry really wanted were Liberty hops.

And just why did George Washington chop down that cherry tree? First of all, they were probably pie cherries, unfit for kriekbier. Second, I'll bet the tree was shading his hop plantings. In the end the reasons are lost in the mists of legend, but the result is the same. He didn't mow down the barley field or dig up the hop rhizomes.



Researchers have

Colonial Porter
(5 gallons, extract and grain)

Ingredients:

- 1/2 tsp. gypsum
- 1/4 tsp. kosher salt
- 1/3 lb. black patent malt
- 1/3 lb. cara-pils malt
- 1/3 lb. dark crystal malt, 90° to 120° Lovibond
- 6 lbs. dark plain malt extract syrup
- 8 oz. blackstrap molasses
- 1 oz. Mt. Hood hop pellets (3 to 4% alpha acid), for 45 min.
- 1 5-in. brewers' licorice stick, chopped or shaved
- 1 cup loosely packed fresh spruce needles
- 10 to 14 g. fruity dry ale yeast or 1 qt. liquid ale yeast culture
- 2/3 cup corn sugar for priming

Step by Step:

To 2.5 gals. of cold water, add gypsum and salt. Steep malts in a muslin grain bag. Gradually raise temperature to 170° F, remove grains, and sparge into kettle with about 2 qts. of hot water. Bring liquor to boiling, remove from heat, and stir in malt extract and blackstrap molasses.

Return to heat and bring up to boiling again. Add hops. Boil 45 minutes. Remove from heat, set kettle in a sink full of ice water. Steep for about 30 minutes in the cooling wort the licorice stick and the spruce needles (it's easiest if these are in some sort of a bag). Remove spruce and licorice, add to fermenter, and top up to 5.25 gals. Cool to 75° F and pitch yeast (Wyeast 1028 or 1275 work well with this brew). Seal up and ferment cool (65° F or less) for about 10 days. Rack to secondary and age cooler (55° to 60° F) for about two weeks. Prime with corn sugar, bottle, and age three weeks.

OG = 1.046

Notes:

Obviously, to use fresh spruce needles this would need to be brewed in early spring when the spruce trees begin to sprout new growth. If you wish to brew it "out of season," however, you can do a couple of things: in season, gather the spruce growth that you will need and freeze it in an airtight, Ziplock bag until needed, or soak them then and there in enough vodka or grain alcohol to cover them completely until you want to use them and then add this potion at bottling instead of as a finish hop. Out of season, you'll have to use commercial spruce essence that you will probably find at your homebrew-supply store. It's not perfect. In fact I find it a bit strong, but it will impart a spruce flavor to anything (including your kitchen, if you spill it). Easy does it, add a few drops (to taste) at bottling.

Molasses:

Blackstrap is ideal, the richest and heaviest of all molasses (except for treacle, of course, but then that's just too British for this recipe, don't you think?) but other dark molasses will do. Try, though, or find "unsulphured" brands, because the sulphur (a preservative) may inhibit fermentation and leave you with a cloyingly sweet beer.

Licorice:

You really should use "brewer's licorice," or raw licorice root. Licorice candy is not the same thing. Most homebrew shops stock or can get real licorice root, so ask. If it's unavailable, you can get a licorice-like flavor by adding sambuca or Galliano liqueur, or by using some anise instead. But the founding fathers would not have used these, surely.

All-grain brewers:

Mash 7 lbs. pale malt plus 1 lb. dark Munich malt (20° Lovibond) and the specialty grains above in 11 qts. of liquor at 150° F for 90 minutes. Sparge at 168° F to get 6.5 gals., add 8 oz. molasses, and boil to reduce to 5.25 gals. Add hops and spices as above.

recovered Washington's, Jefferson's, and others' diaries and account books, and among the papers they have indeed found references to malt, hops, and brewing equipment.

Hops, though, like tea, were predominantly a British purveyance, so it is likely that civic-minded colonial types such as George, Sam, and Thomas would have avoided using them if at all possible. A substitute for hops? There are, naturally, many. One that would have been plentiful and commonly used in colonial and revolutionary America was the needles of the humble spruce tree. Another, less common but just as appropriate, would be licorice in some form: root, anise, or some like herb.

In fact these two flavors in combination are delightfully refreshing. Add a hint of hops (okay, maybe it's not politically correct because the Redcoats are being so stubborn about taxes and things, but it tastes so good) and a very dark, rich beer (the richness comes, in part from the use of molasses, a colonial staple, in addition to the malt) as a base, and you have something worth calling Macaroni.

Reader Recipes:

Premium Bitter

(5 gallons, partial mash)

I love bitters and have brewed quite a few. I brewed this for our beer club's Oktoberfest party. It went over well. Although the yeast used seems a bit out of place, I've found that it does well in the higher-gravity bitters such as this.

Lisa Hudock
West Chester, Pa.

Ingredients:

- 4.5 lbs. unhopped light extract syrup
- 1 lb. Demerara sugar
- 2 lbs. two-row pale malt
- 4 oz. flaked barley
- 2 oz. British Crystal malt, 60° Lovibond
- 2 oz. British chocolate malt
- 1.25 oz. Challenger hops (7.2% alpha acid), for 90 min.
- 1.75 oz. Northdown hops (8.6% alpha acid), 1.25 oz. for 90 min., 0.5 oz. for 45 min.
- 1 oz. East Kent Goldings hops (5.5% alpha acid), for dry hopping
- Irish moss for 60 min.
- Wyeast European Ale

Step by Step:

Mash grains in 3 qts. of water at 151° F until conversion is complete. Sparge with 2.5 gals. of 170° F water. Bring to a boil and add malt extract syrup. Return to boil and add 1.25 oz. Challenger and 1.25 oz. Northdown hops. After 30 minutes add the Demerara sugar and Irish moss. After 15 more minutes add the remaining 0.5 oz. of Northdown. Total boil is 90 minutes. Cool, pitch, and ferment as normal. Dry hop with 1 oz. of East Kent Goldings.

OG = 1.047
FG = 1.011 ■



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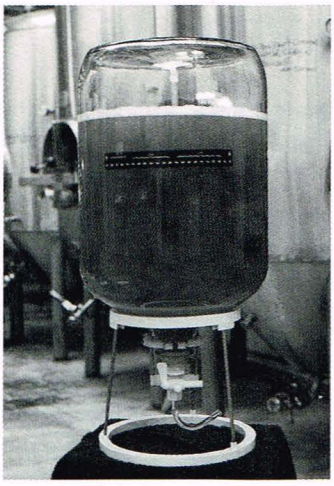


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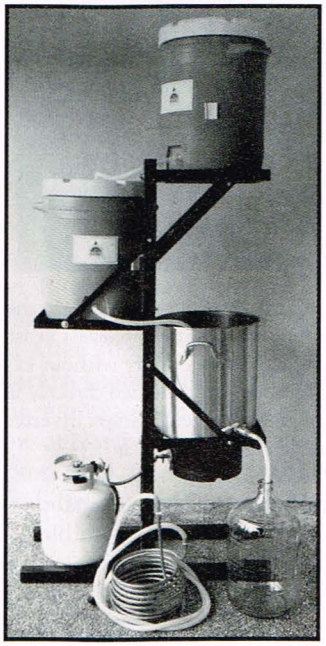
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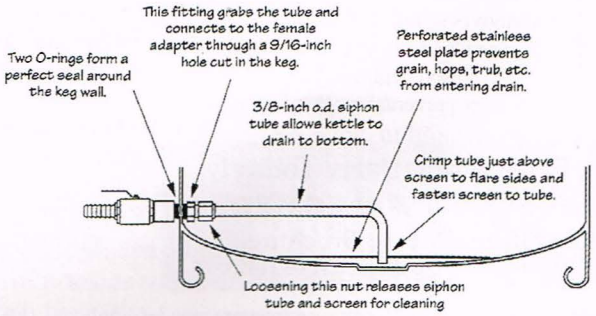
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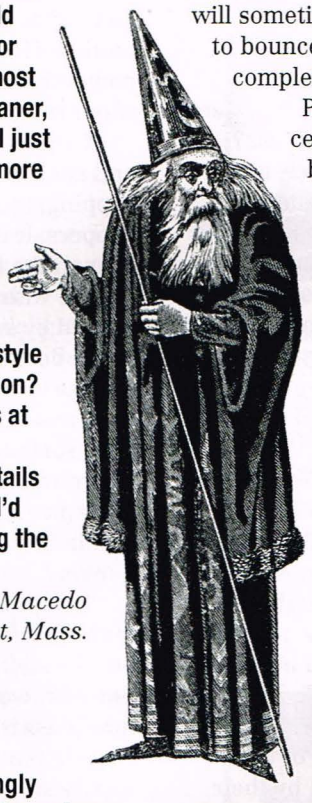
Beer Aging: It's All Downhill

Mr. Wizard

Although I've seen questions regarding aging (primarily lagers) in past issues of BYO, I'm still confused regarding the right time to drink ales made from extract (could there ever be a wrong time for a homebrew?). After using most of my last batch as drain cleaner, I later thought, "Gee, maybe I just needed to let it sit a couple more weeks."

Should the amount of time a brew sits after bottling be based primarily on the original (or final) gravity? Does the particular style of brew factor into the equation? What about the temperatures at which the bottle sits? After paying attention to all the details during the brewing process, I'd hate to think that I'm drinking the brew before it's time.

Mark Macedo
Somerset, Mass.



Mr. Wizard

I am becoming increasingly confused about beer aging. Some beers seem to reach peak form quickly after being bottled or kegged, while others take months. Could you unravel the mysteries of aging for me? What is the actual chemical process that occurs that causes such dramatic flavor changes during aging? What determines how long a beer will need to age? Why does it seem that a beer ages more gracefully in a bottle that has been primed for natural carbonation than it does in a keg with forced carbonation?

Someone once told me that I would be surprised by how aging can improve the quality of a brew. Well, I'm definitely suprised! Now I want to know why.

Mickey Goularte
Exeter, Calif.

Aging. The word alone conjures images of perfection, like a fine wine that has spent a couple of decades in a dank cellar. In wines that are big enough to lay down for this long, flavor hits peaks and valleys and will sometimes start to taste off only to bounce back and gain more complexity.

People with extensive wine cellars hold onto these bottles like volatile stocks in a rocky market, hoping that their perseverance will pay off with something really worth tasting. The risk is holding onto it for one too many cycles only to discover that the wine is bad forever. If only that cabernet had been enjoyed on that rainy autumn evening, but it is now simply fodder for the vinegar bottle.

Aging beer is much different than aging wine, because most beers do not benefit from aging. In fact most commercial brewers who bottle their products consider bottling the beginning of the end. The Anheuser-Busch "Born On Date" campaign is really quite humorous, because the brewery knows very well that there is nothing romantic about beer packaging. A more appropriate name would be "Sentenced to Beer Death Date," but that lacks marketing cachet. There are obvious exemptions to this blanket statement; certain Belgian ales, barleywines, and some strong lagers (e.g. bocks and doppelbocks) can change for the better during aging. Usually the beers that benefit during aging have high original gravities and high alcohol contents.

The changes that occur during aging are numerous and complex, but two key changes that have large effects on flavor are oxidation reactions and yeast autolysis, the latter only occurring in beers containing yeast (bottle-conditioned beers).

Oxidation reactions all require the presence of oxidizing compounds. The most common oxidant is oxygen, but certain metal ions, such as iron (Fe^{+3}) and copper (Cu^{+2}), are potent oxidizers that will quickly change beer flavor. The presence of oxidizing metal ions is never favorable.

The most common cause of oxidation is headspace air from bottling. This problem can be minimized if the beer is foamed immediately before capping, but this requires some dissolved carbon dioxide. Oxygen reacts primarily with alcohols (both ethanol and higher alcohols or "fusel oils") and lipids in beer to form a class of organic compounds called aldehydes. Aldehydes can give rise to a range of flavors including green apple (acetaldehyde), paper or cardboard (trans-2-nonenal), and sherry-like (sherry is the quintessential oxidized wine).

When lipids are oxidized, cheesy flavors are also produced because the lipids are broken down into volatile fatty acids (cheesy) and aldehydes. In dark beers certain malt-derived compounds oxidize to lend sweet, malty flavors to the finished beer.

Yeast autolysis also occurs during aging and can really cause some nasty flavors to show up in beer (see Beat Yeast Bite, page 44). However, in small quantities these flavors can lend complexity to some beers. One of the key attributes to sparkling wines employing bottle conditioning (*method champenoise* as opposed to tank carbonation) is yeast autolysis. The yeast is removed at a certain point in the process to prevent excessive yeast

bite and to allow further aging. To help prevent excessive yeast bite, beers meant to age should contain very little yeast.

There is considerable debate over the perceived positive effects of yeast in bottles of beer. The most common pro-yeast argument is that yeast helps ward off oxidation. Recent research from Belgium seems to dispel many of the accepted ideas about the antioxidant role of yeast in bottle-conditioned beers. Scientists from the Lovain Institute in Brussels recently found bottle-conditioned beers to progressively lose foam stability and ester aromas due to the activity of enzymes released from autolyzing yeast. Yet they showed the same signs of flavor oxidation as beers containing no yeast.

In general beers begin to lose their edge upon aging. Hop notes, fruity aromas, and alcoholic flavors begin to fade. As these fresh beer flavors become more subtle, dark beers will gain sweet, caramel-like, honey, toffee, and cheesy aromas. In lighter beers wet paper aromas are the most obvious oxidized flavors, and their fresh flavors become dulled. The net effect is unappealing.

The types of beers that typically benefit from these age-related mellowing changes are robust, dark, and highly alcoholic beers; kind of like an over-energetic teenager "chilling out" with age and becoming a little more tolerable. Barleywines and Trappist ales are good examples of over-energetic beers that mellow gracefully with age. Thomas Hardy Ale from England, reported to improve for up to 25 years, begins to show after a couple of years pruney, raisiny notes that meld into a mellow and complex melange of rich fruitiness after further aging.

Personally, I would rather catch most beers on an early peak of excellence and enjoy them while the trend lasts, because the future for aged beers holds no guarantees.

On a more certain note I offer this advice: If the beer is best suited for drain cleaning soon after fermentation is complete, don't kid yourself and think it will get better if you let it sit around for a long time. It will simply turn into old beer that is probably a little less effective at cleaning your household plumbing!

Mr. Wizard

I have been homebrewing for more than a year and have been successful with each batch I have brewed. I have not had much trouble with over-carbonation. However, I have found two broken bottles so far. These bottles were not shattered but rather broken in two or three pieces.

Is it possible that these bottles did not break directly from too much pressure but instead because they were old and weakened by repeated use?

By the way, I read an article in a recent issue of BYO about oysters and stout (Oysters and Stout, November '96 BYO). As there are certain wines suggested for different meals, could the same philosophy apply to food and beer? Your advice is much appreciated.

Garry McElhiney
Ravenna, Ohio

Bottles breaking due to age and diminished strength is not only possible but quite common. Although domestic breweries recycle very few beer bottles through returnable glass programs, returnable containers are standard in many other countries. Returnable glass comes back to the brewery in a wide range of conditions. Some of the bottles have been emptied by their borrower, rinsed with water, and carefully placed back in the carton from which they came. These bottles simply have to be de-labeled, cleaned, sterilized, and inspected before re-use. Some bottles have not had it so good. They have been emptied, dropped on the floor, stuffed full of half-burned cigarettes. These poor souls give returnable glass engineers challenges.

In-line detectors have been developed to spot hairline glass fractures and the presence of foreign matter (tiny rodents, cigar butts, lemons...). These detectors scan bottles as they exit the bottle cleaner and automatically reject damaged items.

Many homebrewers, including myself, have intercepted returnable glass by buying cases of empties at the local dive bar with the largest selection of cheap beer in bar long-neck (12-ounce) glass. Through careful rinsing, cleaning, and de-labeling, these grungy, stinky bottles can be readied for duty. The problem is that no homebrewer I know has an in-line glass inspector. Remember the "Laverne and Shirley" episode where they are paid to watch beer bottles as they pass an inspection light? Well, that technique actually works and can be used at home to spot damaged bottles. This method is not fool-proof, however, and some damaged glass can slip through undetected.

Damaged glass is dangerous, plain and simple. If bottles fracture during capping, especially with goose-neck cappers, it is very easy to slice your arm on the fractured bottle. I know a person with permanent nerve damage caused by such an accident. If the bottle does not fracture on filling, pressure created during carbonation can cause failure. Again, if this occurs near somebody, injury can ensue. There was a recent accident involving an exploding beer bottle that resulted in blindness in one eye of the injured person.

I don't want to create unnecessary fear regarding bottling, but I want to be realistic. With the large number of microbreweries around the country, new glass is fairly accessible at reasonable prices (many homebrew supply stores also sell new glass). Two of the best packages are 22-ounce bottles and heavy-weight long-necks. All 22-ounce bottles are made of thick glass and are perfect for re-use. Some microbreweries use returnable-grade 12-ounce long-necks that are also great for re-use. Be careful, however, not to re-use one-way glass, because it is weakened after only a few uses and can unexpectedly fail. Given the potential risks involved with used glass, new glass is not a bad deal.

On to a happier topic, beer and food pairing. The short answer to your question about this topic is yes, beer and food can be matched just as wine and food can. There are many fine books on the market that not only address pairing beer with food but also

give recipes that include beer.

Like wine, certain general flavors found in beer are thought to work with certain dishes. Dry, light-bodied beers with moderate bitterness go well with salads, poultry, and fish. Beers in this category would include wheat beers, pilsners, and pale ales. Beers with a little more bitterness go well with spicy foods, such as a nice IPA with a hot Indian curry. Darker beers, such as porters and stouts, go well with red meats. The classic porter pairing is with London broil. Sweet, high-alcohol beers go well with dessert. Try a big, rich doppelbock with chocolate cheesecake. Delicious!

I can continue pairing beers I like with foods I like all day, but it can get a bit absurd. The best philosophy regarding food and wine (or beer) I have ever heard is that any pairing works as long as the consumer likes the combination. Culinary delights are fundamentally hedonistic, and there is no right or wrong way to practice hedonism!

Mr. Wizard

Recently I brewed a porter. A very nice porter, as it turned out, but something strange happened while it was fermenting. After eight days of primary fermentation, I racked the beer into a carboy. With my previous brews, seven or eight days was plenty of time for the beer to settle down and compose itself so I could rack. However, when I opened the bucket for this brew, the beer was busily foaming away. I wasn't sure what to do, but I didn't want to leave it on the primary trub, so I racked it.

When bottling time came, the beer was nice and tasty but had a finishing gravity of about 1.020. I'm just wondering why the yeast was behaving oddly and if I racked too early. What should I do in this situation? On the other hand, the beer is excellent, so I'm not sure I'd want to do anything different when I brew this porter again.

Scott Gruber
Washington, D.C.

I am forced into an unavoidable tangent about the length of fermentation before answering this question. I have yet to figure out why so many recipes for beer include a time period for fermentation.

The duration of a brewery fermentation is somewhat dependent on the wort's original gravity and hence a particular recipe, but the most important factors about the duration are the concentration, viability, and vitality of the yeast, the temperature of fermentation, the level of wort oxygenation, and the amount of certain key nutrients, such as zinc.

Even breweries with very tight control over every step of the process experience variations in fermentation. Therefore, I am a firm believer in the "let the fermentation go to

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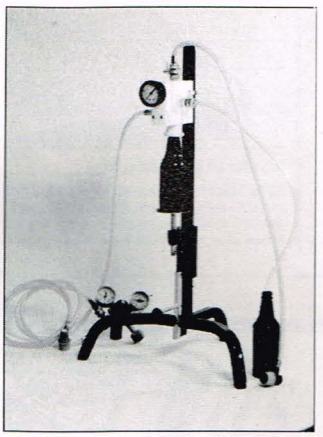
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completion" method of brewing.

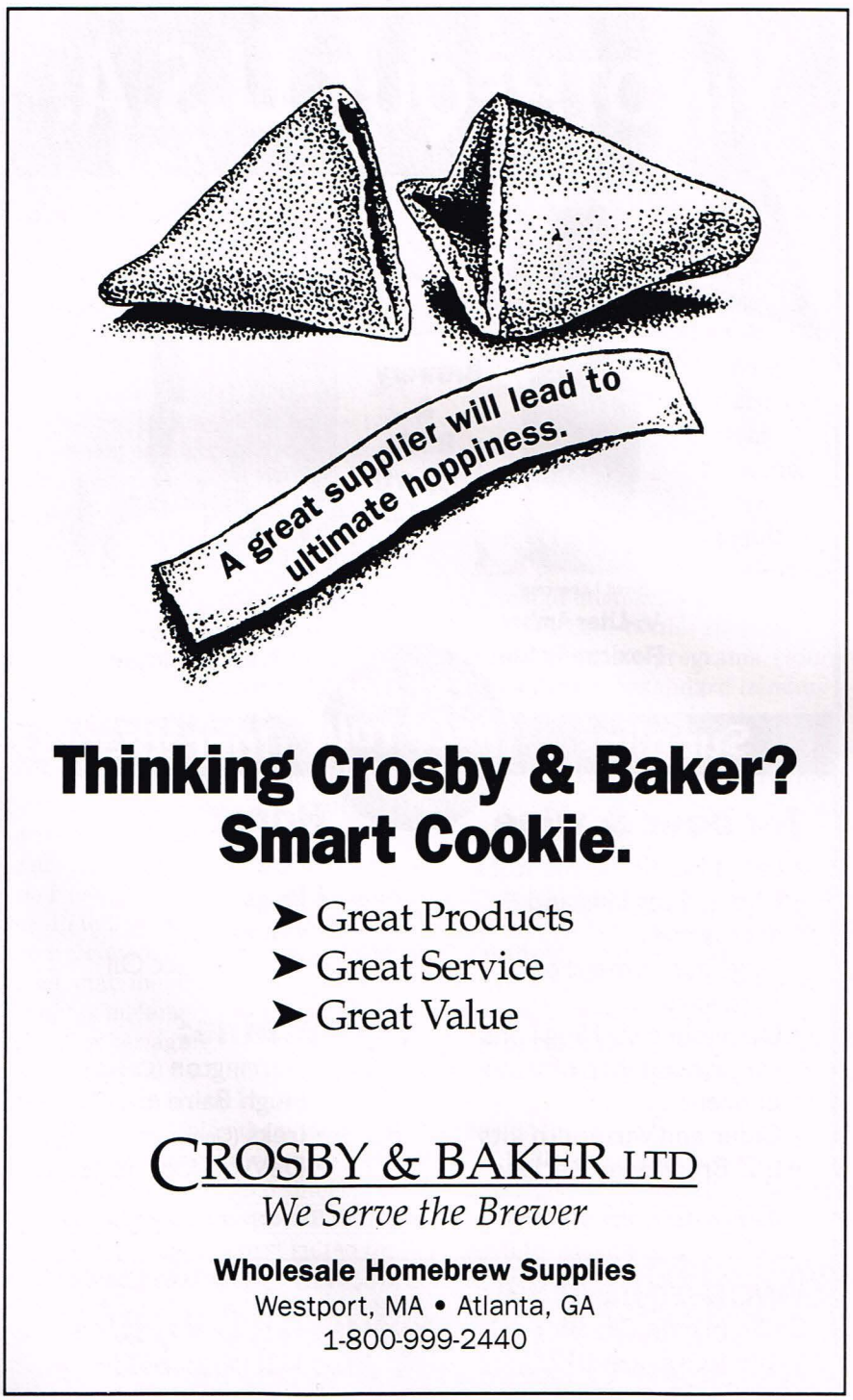
In this particular case I don't agree that your yeast was "behaving oddly" simply because it was still fermenting after eight days. Suppose you under-pitched the wort, a very common occurrence. I would not be surprised at all if the fermentation took longer to begin and end than expected. Or maybe the wort was cooled to 60° F instead of 70° F and your house temperature was cool due to the time of year. Under these circumstances I would expect a slower fermentation.

What I recommend for all brews is to rack the beer only after the goals of primary fermentation have been achieved. If the goal is to ferment to completion, then racking should only occur after the beer's specific gravity ceases to change or the fermentation is visibly complete. I think visual assessment is very reliable. In some fermentations, such as lagers, which depend on secondary fermentation for carbonation, the fermenting wort must be racked before terminal gravity is reached. In both examples the beer is not racked until the goals of primary fermentation are complete.

Your concern about leaving the beer on trub is a valid one, but the off-flavors that result typically show up in beers that spend weeks in the same vessel and become even more pronounced if the beer is warm during this period.

Your second question about the terminal gravity seeming a bit high probably is associated with the premature racking, especially if you chilled the beer after racking. The important thing is that your beer tastes fine. However, in the future don't worry too much about fermentations that seem to move a little slower or a little faster than expected.

As long as the fermentation finishes in an acceptable range of time, you're probably doing fine. I get concerned when fermentations start very slowly and last longer than about two weeks. ■



Mr. Wizard's Address

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

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

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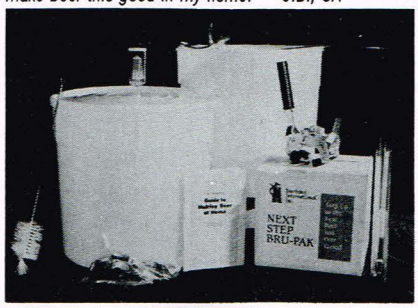
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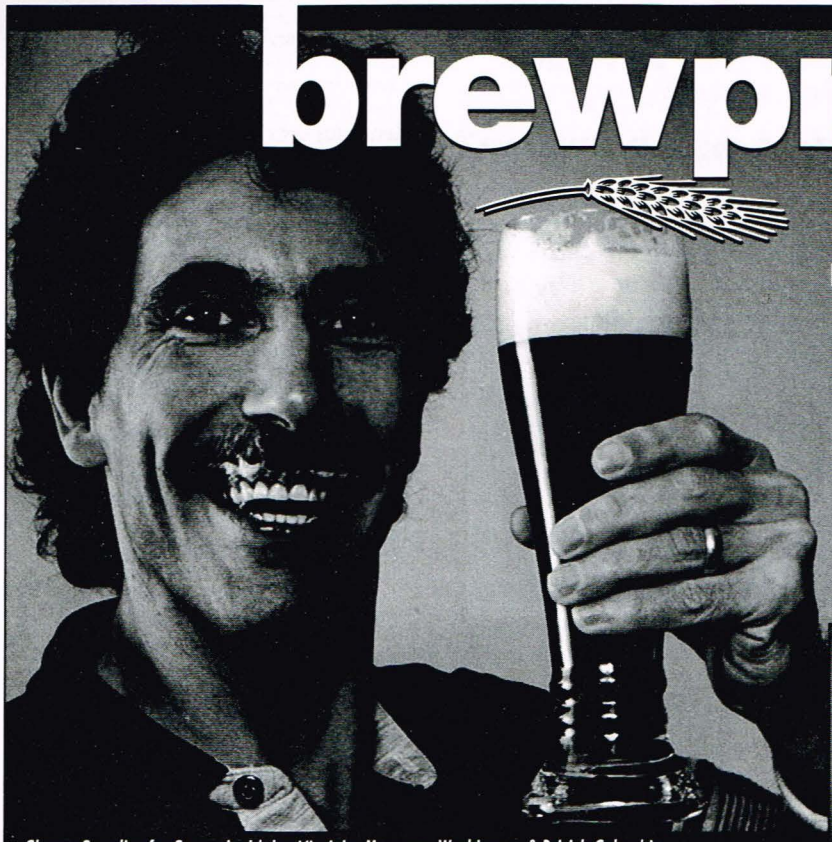
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Prevent Contaminated Beer

by Suzanne Berens

Assets Grille & Southwest Brewing

Brewer: Mark Matheson
Brewery: Assets Grille & Southwest Brewing Co., Albequerque, N.M.
Years of experience: Four
Education: Bachelor's degree in fermentation science from University of California, Davis
House Beers: Cactus Kölsch, Duke City Amber, Copper Ale, St. Pablo's Porter

"You might be able to remedy bad wine but not bad beer. So clean everything."

Brewer: Mark Matheson



The most common form of contamination is bacteria, which grow faster than yeast. The most common cause of contamination is pediococcus or lactobacillus bacteria. Some people are worried about wild yeast. They exist, but their growth rates are slower than bacteria. So concentrate on bacteria. They will give you sauerkraut and cheese smells.

The most common reason bacteria develops is because lines are not clean. The heat exchanger has the greatest potential for harboring bacteria. We rinse our heat exchanger with 180° F water for half an hour. That will kill everything. Either use heat or chlorine (bleach). I use heat because we already have hot water in the brewhouse that we use to mash in with and sparge with. And of course, we make sure hoses and fittings are sanitary.

When you are homebrewing, taste and smell the beer throughout the process. Most information will come from your nose. You can only taste sweet, sour, salty, and bitter on the tongue. But your nose can tell, in some cases, parts per billion. It's a very discriminating testing device. If there's something wrong, it should definitely show up in the aroma.

Look at your raw materials: yeast, hops, water. Make sure your water is fresh, clean, and potable. Make sure your malt is not old and the hops aren't oxidized (oxidized hops have a cheesy aroma).

Clean everything. Use a teaspoon of bleach with five gallons of water.

To prevent contamination you need

The Tips

- **Taste and smell the beer throughout the process. If there's something wrong, it should definitely show up in the aroma.**
- **Clean everything thoroughly. Use a teaspoon of bleach with five gallons of water.**
- **Keep your lag time between pitching and the start of fermentation short, about five or six hours. You want to get everything rolling and active so bacteria does not form.**
- **Try not to open up your fermenter too often. Open it just to get a sample and hydrometer reading when you're really sure you're close to terminal gravity.**

to have a vigorous fermentation. Whenever you introduce wort into the fermenter, your brewery yeast should outdo anything in there. (If this happens), you'll have a good predictable fermentation with the flavor profile you want.

Use liquid yeast. If you use dry yeast, check your lag time. You want a short lag between the time you pitch the yeast and the time fermentation begins. You want to minimize the period of time in which cells are building up in volume. You don't want it to take 12 hours. You want it to take five or six hours, and you want to get everything rolling and active so no contaminant can get in there and really establish itself.

Wild yeast builds up over time and could be caused by dirty equipment. Dried yeast is not a single pure strain. The drying process allows bacteria and wild yeast to be introduced. That's why you should use liquid yeast packs, which are relatively easy to use. Just smack them and dump the yeast in. You'll get vigorous fermentation. Or get yeast from a local brewer. They're usually more than happy to give some to you.

Contamination is more of a concern for some styles of beer. With lighter beers any problems are noticeable, where with a stout you aren't necessarily going to notice as much. Some styles, of course, pose a greater potential for contamination. If the fruit in a fruit beer is not pasteurized, it could cause problems. Lagers are more problematic because at colder temperatures fermentation is not as fast.

Various methods of brewing don't contribute to contamination that much. A lot of people say German brewers don't want to dry hop because it will introduce contamination. But hops are anti-bacterial themselves, so they do have bacteria on them. But it doesn't affect your beer. The British have been dry hopping for centuries.

If you are a homebrewer, try not to open up your fermenter all the time. Open it just to get a sample and a (hydrometer) reading when you're really sure you're close to terminal gravity. That way you're not always exposing the fermenting beer to the air. ■

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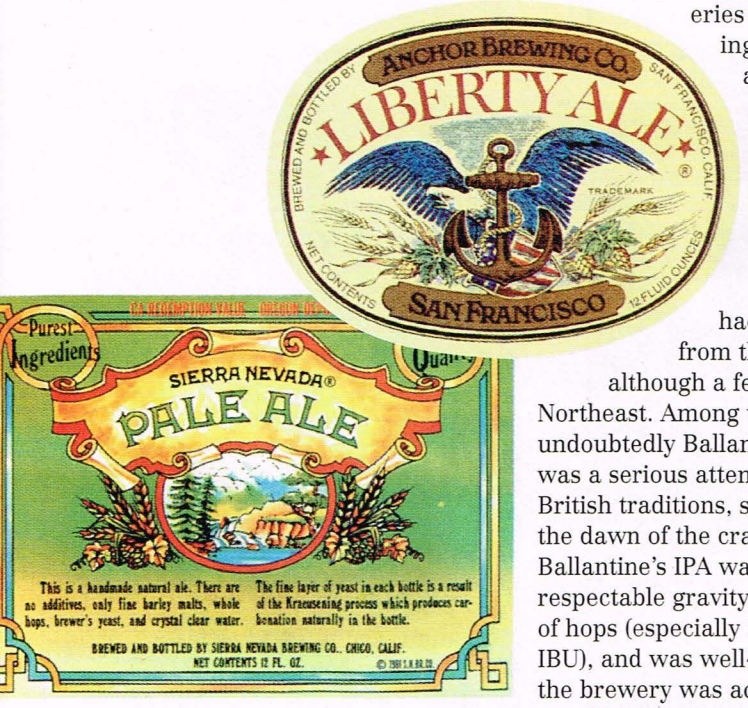
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Brewed with a Little Yankee Ingenuity

by Jeff Frane

American brewers have always been innovators. As European immigrants brought their traditions, their tastes, and their habits to new shores, they usually tried to continue their lives as they had begun them, but new cultures, new languages, and new environments demanded that they adapt.

Brewers were no exception. The earliest brewers in the New World were Dutch and British, producing ales and porters. (Among the best, apparently, were the so-called Puritans. Although they had some strict moral standards, they had no problem with ale at dinner.) By the mid-1800s, however, a new wave of immigrants from Northern and Central Europe introduced different brewing styles and technologies. Pale, clear lagers rapidly replaced the once-popular ales. American breweries responded by adopting the new beer styles and incorporating indigenous grains (primarily corn), which allowed them to more easily brew very pale, very bright beers.



Eventually, ales had almost disappeared from the United States, although a few survived in the Northeast. Among these the finest was undoubtedly Ballantine's, whose IPA was a serious attempt to preserve the British traditions, surviving almost to the dawn of the craft brewing age. Ballantine's IPA was brewed to a respectable gravity (1.076), with plenty of hops (especially Brewer's Gold, at 45 IBU), and was well-aged in oak. In time the brewery was acquired by a larger firm, the ale's production moved to the Midwest, and the beer was toned down to a shadow of its former glory.

Other ales, of considerably less character, continued to be produced in the Northeast somewhat as novelty items. Many, in fact, were not true ales at all in the sense of being top-fermented. Fred Eckhardt, author of *Essentials of Beer Style*, refers to them as "sparkling ales" and notes that they were brewed to compete with the American pale lagers. Like those beers the ales had "minimal taste profile, minimal hopping, and [were] lacking in hop bouquet."

In due time many of these beers were labeled "cream ales," and whatever special character they possessed diminished further. Most were "bastard ales," formulated as a standard beer (although perhaps brewed to be just a little stronger) and fermented with the brewery's regular lager yeast at a slightly elevated temperature for a slightly harsher, slightly fruitier taste. In some states the term "ale" was a label applied to beers of barely more than normal strength and had nothing at all to do with the beer's method of production.

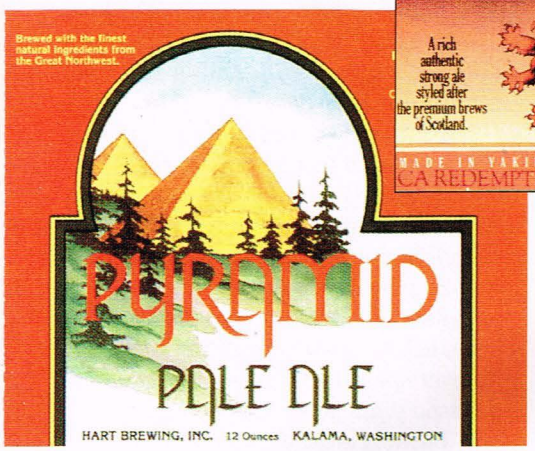
By the late 1970s and early 1980s virtually no true top-fermented ales were being produced in the United States, and America's oldest brewing tradition was in imminent danger of disappearing entirely.

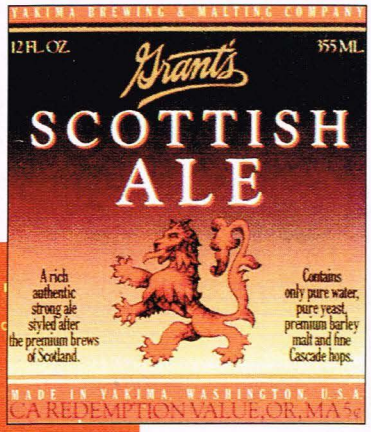
The new tradition arose in California. Anchor Brewing Co. began tinkering with a real ale in 1975 (which eventually emerged as Liberty Ale), and New Albion (perhaps the first true microbrewery) introduced an ale a year later. Within a few years homebrewers Ken Grossman and Paul Camusi launched Sierra Nevada Brewing Co., also in Northern California, and the craft-brewing industry began to take its first, faltering steps. No one at the time had any idea of how much would change, of course, or how quickly.

Since California (and soon the Pacific Northwest) had no ale tradition

to revive, the brewers were free to create a new one. Although they were, in a sense, emulating the British styles of beer, what emerged was a distinctly American version.

In fact the American ale arose as the British ale was doing its best to sink. In England industrial consolidation had caused small breweries, with their distinctive beers, to disappear. New, "convenient" technologies were replacing the delicate care of the old traditions and further defusing the character of the ales. Outrageous excise taxes, levied on the original gravity of the beer wort, caused brewers to curtail the alcohol content of their beers.





In the United States, however, consumers had begun a reaction to the long trend toward homogeneity in much of what they ate and drank. Boutique wineries were blooming, and newly affluent customers were looking at everything from mustard to pizza, coffee to bread, in search of new, more interesting flavors. The radical approaches of Sierra Nevada Pale Ale and Liberty Ale, and all the pale ales to follow, met with a surprisingly positive reception.

In many ways Sierra Nevada's ale can be taken as the prototype of the new American pale ale (in fact there are two Sierra Nevada Pale Ales, the draft version and a slightly different bottled version; both are classics). With an original gravity near 1.048 to 1.052, Sierra Nevada's ale is 10 to 15 points higher than a British equivalent. It is an all-malt beer, and the malts are very American (two-row pale, caramel, and dextrin). And significantly, the hop flavor is unabashedly American. In fact they are primarily the signature Cascade hops, citrusy and floral. Of all the American hops, Cascade and her sister varieties are the most obvious stamp of an American pale ale, unmistakable in their assault on the palate.

Sierra Nevada Pale Ale falls smack in the middle of the style's color range, somewhere between very pale golden and ruddy copper. Unlike many British ales the Sierra Nevada yeast finishes very crisp and dry, with none of the characteristic British fruitiness. (The yeast is Sierra Nevada's one serious link to the old American ale tradition — it is the same strain once used to brew the classic Ballantine's ales.)

Within a few short years American pale ales in their myriad variations began to appear throughout the Pacific Northwest and, eventually, around the country. In its purest form the style seems to still be a West Coast beer, with Eastern brewers slightly more influenced by British brewing revivals and traditions.

For a time it seemed as though the brewers around Portland and Seattle were competing to produce the most intense, most bitter, and most hoppy beer imaginable. Amazingly, there were a lot of us willing to egg them on, and the mid-'80s hopping rates went up and up.

Among the great Cascade-drenched beers of the time were Grant's Scottish Ale, Portland Ale, and the real Cascademonster, Pyramid Pale Ale. Other beers emerged with different blends of hops, and different character, but always with an eye to challenge and engage a new style of beer drinker.

With very few exceptions these first American pale ales were draft-only beers. Not only were bottling lines expensive and demanding, but liquor laws in Oregon and Washington had ensured that few drinking places served anything but beer and wine. An unusually high percentage of beer sales were in taverns, and drinkers were already used to the notion of

American Pale Ale

(5 gallons, partial mash)

Ingredients:

- 8 lbs. Alexander's Extra Pale Liquid Malt Extract
- 1 lb. two-row pale malt
- 0.5 lb. crystal malt
- 0.5 lb. cara-pils malt
- 2.5 oz. American Perle hops (6.5% alpha acid), for 75 min.
- 1.75 oz. Cascade hops (5.4% alpha acid), 0.75 oz. for 15 min., 0.5 oz. at end boil, 0.5 oz. dry hopped in secondary or keg
- 1 qt. Wyeast 1056

Step by Step:

Soak crushed grains in 0.5 gal. of 150° F water for one hour, then rinse with one gallon hot (170° F) water into kettle. Add malt extract and water to bring volume to 2.5 to 3 gals., depending on kettle size. Boil for 15 minutes. Add American Perle hops and boil an additional 60 minutes. Add 0.75 oz. Cascade hops and boil 15 minutes more. Add 0.5 oz. Cascade hops at end boil. Total boil is 90 minutes. Add wort to sufficient amount of pre-boiled, chilled water to bring volume to 5 gals. Aerate thoroughly and pitch yeast.

Ferment in open primary at 65° F for one week or until head falls. Rack to carboy and finish fermentation at same temperature. If bottling, dry hop with 0.5 oz. Cascade hops in carboy and hold in secondary for two weeks. If kegging, add dry hops (in hop sack) at kegging time and condition cold for two weeks before tapping.

going out for a beer.

As the craft-brewing movement spread and the demand for market share increased, brewers began to scale down the intense characters of their beers, and those that survive today are far more restrained than they once were. Admittedly, many of those beers were out of balance and one-dimensional, but for avowed hop freaks it was something of a Golden Age.

Plenty of American pale ales survive, of course. Like amber ales, American pale ales appear regularly on the lists of brewpubs and microbreweries. As amber ales are defined by their malt — caramel malt giving a characteristic copper color and sweet taste — American pale ales are defined by their hops. More specifically they are defined by the assertive use of American hops — good, pronounced bitterness and a noticeable, floral hop nose. Although various hops are used, Cascades are nearly a cliché for the style.

American pale ales can vary in color from very pale to copper and are generally medium-bodied and well-attenuated (dry). They are invariably all-malt, based on very pale American two-row malt, with some caramel and dextrin malts. Original gravities range from 1.045 to 1.060, generally in the middle of the range. Mash cycles are very simple: single-step infusions at 152° to 154° F.

Yeast strains are typically very neutral, although some rare examples such as Bert Grant's Scottish Ale have a fruitier, more obvious contribution. Sierra Nevada's strain is one of the most widely used in the microbrewery industry. This yeast is aggressive, neutral, and capable of fermenting at relatively low temperatures (around 60° F). It is variously known as 1056 (Wyeast's number), Chico (Sierra Nevada's hometown), and American Ale. Since the brewery bottle-conditions its beer, the bottled products can be a source for the yeast, but nowadays its bottling procedure leaves very little to harvest.

Anchor uses open fermenters but most craft breweries use closed, cylindro-conical fermenters. Homebrewers can exercise their own options: open primary fermenters or carboys with blow-off hoses.

Very good American pale ales can be produced at home with malt extracts and grains, as long as plenty of care is taken with sanitation and a good, healthy yeast starter is pitched. Hopping rates for partial-wort boils should be increased to make up for a lower extraction rate. Dry hopping is particularly useful in brewing this style of beer, as it really emphasizes the hop nose. Another alternative is the use of a hop back, passing hot wort through a screen or basket of fresh, whole hops. ■

American Pale Ale

(5 gallons, all-grain)

Ingredients:

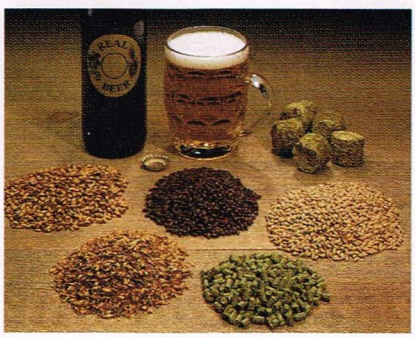
- 8 lbs. Great Western two-row pale malt
- 0.5 lb. crystal malt
- 0.5 lb. cara-pils malt
- 1.5 oz. American Perle hops (6.5% alpha acid), for 75 min.
- 1.5 oz. Cascade hops (5.4% alpha acid), 0.5 oz. for 15 min., 0.5 oz. at end boil, 0.5 oz. dry hopped in secondary or keg
- 1 qt. Wyeast 1056

Step by Step:

Mash in 3 gals. of 170° F water for 90 minutes or until iodine test is negative. Sparge with 170° F water to 6 gals. Boil for 15 minutes. Add American Perle hops and boil an additional 60 minutes. Add 0.5 oz. Cascade hops and boil 15 minutes more. Add 0.5 oz. Cascade hops at end boil. Total boil is 90 minutes. Cool, aerate thoroughly, and pitch yeast.

Ferment in open primary at 65° F for one week or until head falls. Rack to carboy and finish fermentation at same temperature. If bottling, dry hop with 0.5 oz. Cascade in carboy and hold in secondary for two weeks. If kegging, add dry hops (in hop sack) at kegging time and condition cold for two weeks before tapping.

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TODD HAMMOND

CONQUER CHILL HAZE

by Sam Wammack

All good chefs know that the appearance and presentation of food is just as important as the flavor. If a steak is an unappetizing shade of gray, it will seldom be appreciated, even if it's delicious. It's the same with beer; a great deal of the perception and appreciation of beer comes from the way it looks. Everyone likes to see a sparkling, clear European pilsner, Oktoberfest, or pale ale, and even dark styles such as stout and porter look a lot better when they are clear black instead of muddy brown.

Have you ever proudly poured a bottle of your favorite homebrew for a friend, only to find that chill haze has made the beer foggy and "yeasty" looking? At this point the homebrewer usually has to launch into an embarrassing explanation of how homebrew is different from commercial beer. We can explain how our beer is naturally fermented and unfiltered, but in the minds of most people, a hazy homebrew is still going to compare poorly with crystal-clear commercial beer.

It's not hard to make sparkling, clear beer once we understand what causes cloudiness in beer. Good brewing practices, combined with the correct use of the clarifiers that are available, will enable any homebrewer to make beer that is admired for its brilliance and clarity.

Understanding Chill Haze

Most beers are clear at room temperature. If there are haze-producing proteins and tannins (both primarily from malt) suspended in the beer, haze particles don't form because of the warm temperature. When beer is chilled, these proteins and tannins react to clump into larger particles that are big enough to reflect light. The haze clumps are white, and while they are suspended in beer, they make the beer appear hazy or milky. The clumps are slightly heavier than beer, so if the beer is kept undisturbed at refrigerator temperature for a few weeks, it will become clear again as the protein settles to the bottom of the bottle.

Major commercial breweries solve the haze problem very effectively using several methods. One is to chill the beer to very low temperatures (30.2° F or -1° C) prior to filtration — they give it a bad chill haze on purpose. Then the



During the boil Irish moss helps drop haze-producing protein particles out of solution.

beer is run through a filter that removes both haze and yeast. Homebrewers can't use this process if they want to use natural carbonation at bottling time, because natural carbonation requires the presence of live yeast. Brewers who are using a kegging system can cold-filter their beer, then artificially carbonate it by injecting CO_2 gas. Beer that is filtered in this way will be crystal clear at any temperature, and there will be no yeast sediment.

To make clear beer without filtering, the idea is to keep those haze particles from being present and suspended in the finished beer. There are lots of ways to do this, and it is best to use a combination of several techniques, all of which either remove proteins, tannins, or haze. A good start if you are mashing a grain beer is to take a protein rest between 113° and 140° F. At that temperature some haze-causing proteins are destroyed by enzymes, and many are made insoluble by reactions with other compounds in the mash.

Combating Haze

The most important practice in producing clear beer involves using heat and cold in just the right way to drop protein out of the wort. A good rule is to boil it as hard as you can, then chill it as quickly as you can.

In the brewing kettle a good, rolling boil of about one hour will help the clarity of both all-grain and malt extract beers. A rolling boil makes the tannins and other compounds that form the hot-break material, or trub, collide with protein particles. A good rolling boil causes more protein and tannin removal than weak boils. After boiling there are still some proteins in solution. Much of the proteins form cold trub during chilling.

Rapid and effective wort chilling, with a wort chiller, is a vital part of this process. When boiling wort is rapidly cooled, the trub forms large particles and drops to the bottom. This is called the cold break, and it drops a lot of protein out of solution. After chilling and a good cold break rest (for about two hours), the clear wort can be siphoned or poured into a primary fermenter, leaving cold trub and haze-forming compounds behind.

Unfortunately, this effect is lost if the wort is cooled slowly. Many homebrewers let the boiling wort cool overnight in a sealed, sanitized container, then pitch yeast the next day. When this is done, the beer will always have a chill haze because the haze-forming compounds will have remained in solution.

When used in combination with this boil-and-chill method, Irish moss is an important clarifier. Irish moss is a seaweed (chondrus crispus) that is harvested from the Atlantic, then dried and broken into flakes.

The active ingredient in Irish moss is carrageen, which is used in many food products as well as in beer. Carrageen has a natural negative electrical charge, and the protein particles in boiling beer wort have a positive electrical charge. When they encounter each other in boiling beer wort, they stick together. And since the Irish moss is very heavy, it helps to drop these compounds out during wort chilling. One-half teaspoon of Irish moss should be added to every five-gallon batch of beer 15 minutes before the end of the boil. Avoid chill haze by serving beer around 55° F.

There are many other clarifiers available, such as bentonite, gelatin,

Tips From the Trenches

• Include a small amount of uncrushed roasted barley, chocolate malt, or black patent malt with the specialty grains in a recipe.

Use about one ounce of one of these grains, even in beer styles that don't call for dark grains, such as American light or Oktoberfest. The husks of these grains are rich in tannin, and tannin helps protein bond to the trub in the boil.

Because the grains are uncrushed and such a small amount is used, color and flavor are not affected.

• Start siphoning from the brewpot into the primary fermenter.

If you use an immersion-style wort chiller, stir the wort until the temperature is down to 90° F, then keep the wort chiller running but leave the wort undisturbed. This allows all the trub to settle to the bottom of the pot.

When the temperature reaches 75° F, siphon with a sanitized racking tube and length of tubing into the fermenter.

Hold the intake end about one-half inch below the surface of the wort, and clamp the outflow at the very top of the fermenter, so the wort will splash and pick up oxygen.

As the level of wort drops in the brewpot, follow it down, keeping the intake just below the surface. This allows you to leave almost all the trub and protein out of the fermenter, and it can make a big improvement in the clarity of your beer.

isinglass, papain, and others. Each of these has its adherents, and they all work well in certain situations. These are properly called "finings," as they are added to the beer in the secondary fermenter or at bottling.

Gelatin works by combining with tannic acid present in the beer. These combined particles adhere to yeast and proteins, then sink. Add gelatin to the beer before you rack to bottles or keg, and make sure the solution is mixed well. A product made from cow and horse hooves, gelatin works most effectively in beer that is 50° F or colder. The closer the beer is to freezing, the better the gelatin will work.

Isinglass is the fining traditionally used in British cask-conditioned ales. Derived from the swim bladder of the sturgeon, isinglass is prized for its ability to quickly settle ale yeast out of solution. Isinglass must be mixed in a mildly acidic solution to work in its traditional form. Homebrew shops sell isinglass in a prepared solution that can be added directly to the keg or bottling bucket.

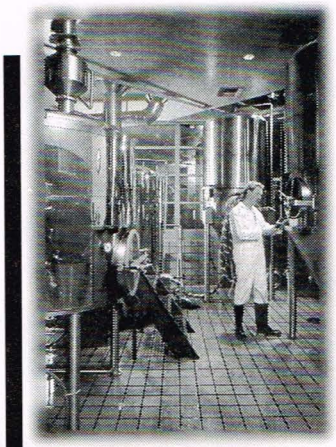
Papain is an enzyme that prevents haze by breaking down proteins. The downside is that this causes foam stability to suffer. Papain is derived from the papaya plant and can be found at some hombrew shops and specialty herb stores. Add a small amount to the bottling bucket.

Polyvinyl polypyrrolidone (PVPP) is a powdered plastic that functions as an adsorbent. It physically attracts other compounds through static electricity. PVPP, best known under the brand name Polyclar, is popular among commercial brewers because like other adsorbents, it is quick and effective. Use PVPP in the secondary fermenter, not at bottling time. It's best to rack the beer after the fining has finished its work.

Other adsorbents include silica gel and bentonite, a ground clay that can be difficult to use because it can affect flavor and head retention.

Each of these finings works by either dropping suspended protein or tannins out of the beer or by removing it entirely. I think these are certainly worth a try if you are so inclined. A lot of the fun of homebrewing is in coming up with your own methods and making them work. ■

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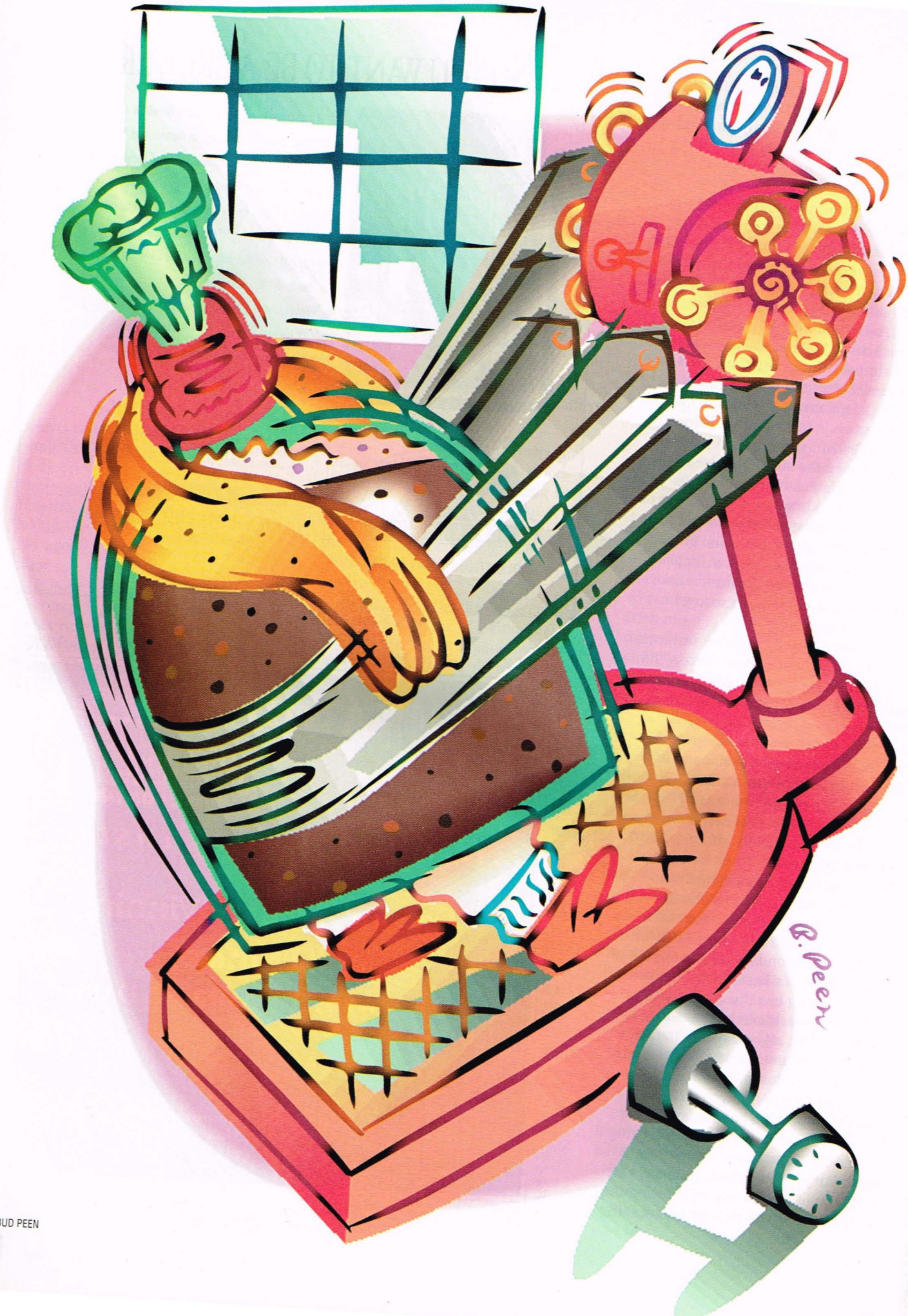
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BUD PEEN

Tastes Great! Less Alcohol!

You can brew a low-alcohol beer that tastes a lot better than any you can buy.

by Kirk Fleming

It doesn't seem to take most homebrewers long before they get to the idea of brewing the world's biggest beer. After figuring out how many cans of malt extract it will take to get a starting gravity of about 1.090, the Big Brewer is well on the way toward his or her first Powerhouse Porter or Stampede Stout. Yes, big is beautiful, and the thought of making a 9 percent-alcohol Paint Peeler Pale does warm the heart.

But besides the high cost of such experiments in extravagance, big beers have their drawbacks. You may find that, no matter how wonderful the taste and satisfying the mouthfeel, you can only have a glass or two before you feel a little too, well, full. And even if you were in the mood for something extra, guests having to spend the night may not have been



Berliner Weisse has a low alcohol content (2.2 to 2.7 percent) "in style" so is a good choice for a low-alcohol brew.

what you had in mind.

Finally, big beers always mean big calories. Most homebrewers enjoy their hobby because they can brew beers that are complete, not stripped of body, aroma, and color like so many big commercial products. But the price to pay may be a few hundred calories per pint and all that eventually comes with them.

Fortunately, you can make great-tasting beer that has a low enough alcohol content to allow you to enjoy that extra pint. Other added attractions may be fewer calories and lower cost, too. Although brewing non-alcoholic beer (by law, less than 0.5 percent alcohol by volume) is very difficult for the amateur brewer, making a "three-two" that tastes like actual beer is easy. Here are some of the options and challenges of lightweight brewing.

Alcohol by the Numbers

Take a look at your hydrometer. If it's like most of them used by homebrewers, there are three scales. The "potential alcohol by volume" or "percent alcohol" scale and the specific gravity scale are the two we're interested in. To figure out the alcohol content of your beer, you need the original gravity (OG) reading before fermentation begins and the final gravity (FG) reading when fermentation is complete.

Read the value from the percent-alcohol scale that appears next to your beer's OG reading. For example if the OG is 1.045, then the corresponding percent alcohol reading is 6 percent. Next, do the same with the final gravity reading. If the FG is 1.008, the corresponding percent alcohol value from the hydrometer is about 1 percent. To find the actual percent alcohol of the beer, subtract the FG reading from the OG reading: 6 - 1 = 5 percent.

Try a few of these with numbers you may have recorded for previous batches of beer. The exercise demonstrates the entire basis for brewing low-alcohol beer: The alcohol remaining in your beer is determined by the difference between OG and FG. This may not seem too startling; most beginner books on brewing will mention it. But here's what it means. You can brew low-alcohol beer if you can do any of the following:

1. Design your beer so the OG is low and therefore closer to the FG.
2. Design your beer so the FG is high and therefore closer to the OG.
3. Change your finished beer in some way to raise its FG.

These are the basic facts. The trick is to use them alone or in combination to get both a lower-alcohol beer and a good-tasting one in the same glass.

How Low Can You Go?

Getting a low OG is about the easiest of the three techniques. Just don't use as much grain or extract as you normally would to make the same size batch. A simple way to start is to take a favorite recipe having a moderate starting gravity and scale it down a little. For example here's a five-gallon recipe for a light pale ale with a starting gravity of about 1.040:

- 3.3 lbs. Alexander's light malt extract
- 1.5 lbs. Alexander's amber malt extract
- 0.5 lb. brown sugar

By multiplying the first two ingredients by three-fourths, the resulting recipe produces the same five-gallon batch with an OG of about 1.030:

- 2.5 lbs. Alexander's light malt extract
- 1.0 lbs. Alexander's amber malt extract
- 0.5 lb. brown sugar

Unfortunately, this method can leave you with a thin-bodied beer. Simply proportioning a great medium-gravity recipe to get a low-gravity one often results in disappointment. The lightweight beer finishes with a gravity even lower than the recipe it was patterned after, instead of bringing the OG and FG closer together, and the feeling can be very watery.

In this case since brown sugar is very fermentable and contributes nothing to help mouthfeel, a better choice might be to leave it out:

- 2.5 lbs. Alexander's light malt extract
- 1.5 lbs. Alexander's amber malt extract

This recipe will start around 1.030 but will be more likely to finish a little higher than the first attempt, with the added benefit of reducing the alcohol content slightly more as well.

A similar idea works well with partial- or full-mash brewing. Lower the OG by reducing the pale extract or pale malt, but keep the percentage of dark and specialty grain higher than normal. This will leave more body and flavor in the beer. You may have to compensate with lighter specialty grains so the beer doesn't get too dark.

Starting Big, Staying Big

It can be a challenge to maintain the big, bold taste in a recipe having an OG of only 1.030 or so. The second trick is to keep the final gravity higher than normal. Remember, it's the

difference between the starting and finishing gravities that determines alcohol content. If you want a higher starting gravity, then you'll need a higher finishing gravity, too.

There are several ways to ensure a higher FG. Adding ingredients to your recipe that just don't ferment very well, such as extremely dark malts or roasted grain for partial- or full-mash recipes, will work. This is the reason so many stouts finish as high as 1.020 or more. Dark extract works the same way.

For all-grain brewers high mash temperatures (158° to 162° F) can be used to limit fermentability, particularly in thin mashes (with more water than normal). Use caution, however, since excessively hot mashes can create starchy wort, which is unacceptable.

Another method is to select a yeast that has a low alcohol tolerance and low attenuation. This will make your beer finish high because the yeast will not ferment the wort as completely as a high-attenuating yeast. These characteristics of yeast are often available on a data sheet at your local homebrew-supply store and can be used along with an appropriate recipe to stack the cards in your favor. There isn't a lot of difference in attenuation from one

English Ordinary Bitter
(4 gallons, all-grain)

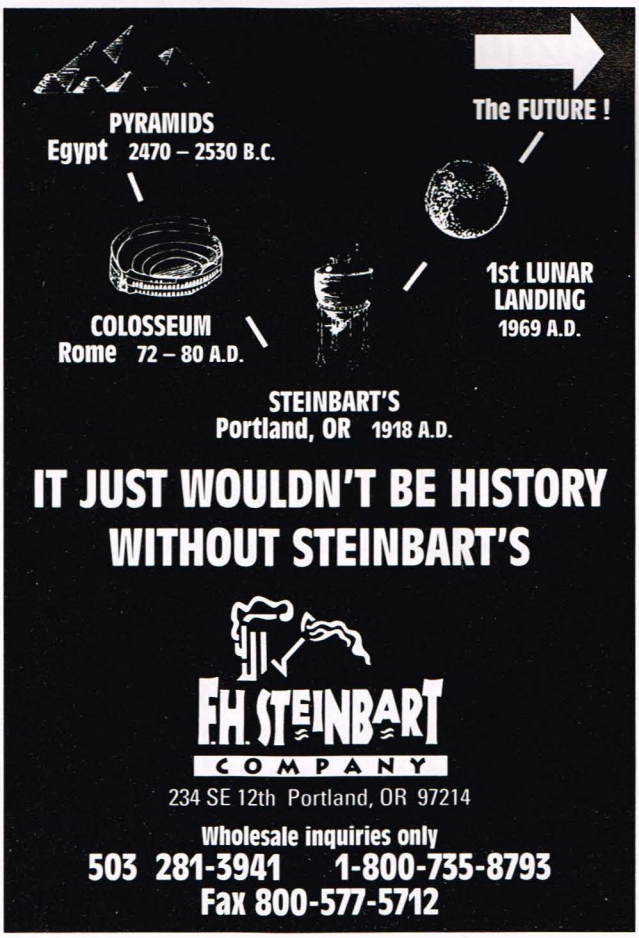
Ingredients:

- 3.25 lbs. pale ale malt
- 8 oz. crystal malt, 60° Lovibond
- 2 oz. cara-pils malt
- 0.25 oz. black patent malt
- 1 oz. Northern Brewer hops (8.2% alpha acid), 0.5 oz. for 60 min., 0.5 oz. for 30 min.
- 2/3 oz. Kent Goldings hops (4.5% alpha acid), for 5 min.
- Wyeast 1084 ESB yeast

Step by Step:

Add 1.5 qts. of 160° F water per pound of grist to get a thick mash at 154° F. When you reach 154° F, rest for 45 minutes. Add enough boiling water to raise the mash to 170° F. Rest for 10 to 15 minutes, then sparge with enough 180° F water to draw off the desired final volume plus 1 to 1.5 gals. Bring to a boil and add 0.5 oz. Northern Brewer hops. Boil 30 minutes, then add remainder of Northern Brewer. Boil another 25 minutes, then add Kent Goldings. Total boil is 60 minutes. Cool and pitch yeast.

Use your own efficiency to tune the grain bill for an OG of about 1.030. This should produce a beer with about 2.5% alcohol.



CIRCLE 29 ON READER SERVICE CARD



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strain of yeast to another, though, so yeast choice alone will cause incremental rather than wide swings in alcohol content.

A technique used for brewing rich, malty Scottish ales that finish with fairly high gravities is to make life miserable for the yeast.

After getting a good start on the fermentation, reducing the fermenter temperature to the low 60s (or lower) can really make a difference in the final product. Wyeast's Scottish ale yeast, for example, will work at these lower temperatures but will leave a final gravity several points higher than you'd expect if fermenting in the low 70s.

Finally, you may have gotten a high FG before when you didn't want it and been advised to aerate the wort prior to fermentation.

You might be tempted to reason that not aerating will make fermentation sluggish, and a high FG will be the reward. Don't believe it. This is a very unpredictable method and no matter what kind of beer you're after, a good healthy start for the yeast is always a wise move.

Reducing Alcohol Content

Water and alcohol have a very cozy relationship, and separating the two in the kitchen is tough. Two techniques work, more or less: Heat the finished beer to drive off the alcohol, which evaporates at a lower temperature than water, or cool the finished beer to drop out the alcohol, which freezes at a lower temperature than water.

Many homebrewers have tried both techniques, and many have given up. Heating can be a long, slow process. The percentage of alcohol in even a high-octane beer is so low that even high temperatures don't evaporate it very quickly. The resulting product has to be cooled and force carbonated, hopefully all without contamination.

One freezing technique is to fill one or more two-liter plastic soda containers with the finished beer (uncarbonated, preferably), cap the bottles, and put them upside down in the freezer. Much of the alcohol will drop to the lower end (the capped end) and can then be poured out. This works a little better with very light, well-bittered beers such as Czech pilsners — the freezing process seems to drop out both color and hop bitterness.

When heating or freezing the beer, flavor may not be what it once was, but you'll have to be the judge of that. The results from the Fleming Kitchen are mixed and, by the way, spouses just love this stuff, you know.

I heated two liters of a pilsner (OG = 1.034) to 130° to 140° F for two hours, then cooled it and measured the new gravity. Before heating, the final gravity on this beer was 1.004. After the two-hour period it had come up to 1.010. Another hour raised it to 1.015, which is where I decided to stop. Assuming only alcohol was evaporated during this period, the change in alcohol content was from about 3.1 percent down to about 1.9 percent.

I also froze two liters of the same beer, and although a dark, very alcoholic liquid was separated from the frozen pilsner, the final gravity of the beer wasn't raised measurably.

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The Light Styles

Overall, the easiest and most effective way to make low-alcohol beer, from my experience, is to start with a good low gravity recipe. Removal of existing alcohol using moderate heat for an extended period is more effective (and easier) than separation by freezing and has only modest effects on the flavor and color of already light beer. If you want to try either of these heating or cooling techniques, I'd suggest using a readily available commercial American light lager, such as Budweiser or Coors Gold, for a low-risk experiment. Any effects on flavor or color will be very obvious with these beers.

A quick glance through the 1997 American Homebrewers Association style guidelines reveals several wonderful styles to choose from in selecting a beer having lower alcohol "in style." English light and dark milds (2.7 to 3.2 percent), American wheat (2.8 to 3.6 percent), English ordinary bitter (2.4 to 3 percent), Scottish light ale (2.2 to 2.8 percent), sweet stout (2.5 to 5 percent), American light lager (2.8 to 3.5 percent), and Berliner weisse (2.2 to 2.7 percent) are all classic styles you can build and still be "light."

Brewing flavorful light beer is possible if you think about what can be done to ensure both a low starting gravity and good body. Experiment a little — you'll learn a lot and have fun at the same time! ■

MacLean's Wee Lean
(5 gallons, extract and grain)

Ingredients:

- 3 lbs. Alexander's Light Malt Extract
- 1 lb. Light Munich malt
- 4 oz. British crystal malt, 50° to 60° Lovibond
- 2 oz. Chocolate malt
- 1.5 oz. Fuggles hops (3.2% alpha acid), for 60 min.
- Ale yeast such as Wyeast Scottish Ale Yeast

Step by Step:

As you bring three to 5.5 gals. of water to a boil, add the malt extract. At the same time prepare three quarts of 160° F water with crushed Munich, British, and chocolate malts.

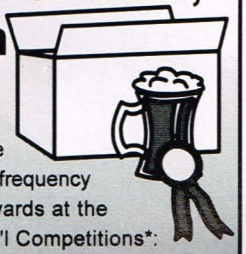
After the grain has steeped for 30 to 40 minutes or when the kettle begins to boil, strain liquid into the kettle with the malt extract.

When the boil commences, add hops. Boil for 60 minutes. No finishing hops. Cool and pitch yeast.

Bottle or keg according to your normal methods.

OG 1.030

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BREAD *from* Spent Grains

by Dennis G. Midden

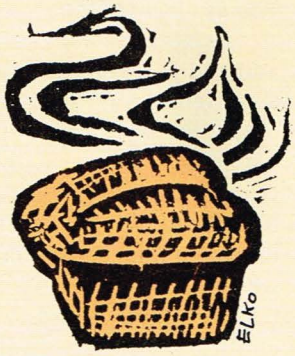
Throughout history beer and bread are often mentioned together. In fact it is hard to find a reference to one that does not mention the other. Ancient Egyptian drawings depict the making of beer and bread. In medieval Europe housewives were responsible for making the beer and bread — which one they made depended on what was needed that week. In many parts of the continent, beer is still referred to as "liquid bread." There are even stories of beer made from fermented bread.

Bread and beer have the same basic ingredients: grain, water, and yeast. Because bread is a fundamental food source and beer a necessary luxury in the life of a homebrewer, why not combine the two? One easy way to incorporate brewing in your baking is to use your spent grains as ingredients in a bread recipe. Better yet, this makes delicious and unique bread.

Bread Fundamentals

Bread has four basic ingredients: flour, water, yeast, and salt.

Flour: Sources of bread flour include wheat, barley, corn, rice, potatoes, and soybeans. In most cultures wheat flour is the primary ingredient for bread because it contains a form of protein called gluten. When combined with water and developed into a dough, wheat flour provides an elastic quality called "extensibility." This





characteristic allows the dough to expand, just as the surface of a balloon expands when it is blown up, and provides the proper tension to entrap the gases created by the yeast.

American all-purpose flour can be successfully used for bread. Some bakers go out of their way to find high-gluten flour that is used in commercial bakeries. There are companies that specialize in organic flour. (Gusto's in South San Francisco, Calif., is an excellent source for these types of grains and flour). Nonetheless, the different types of white flour give only slightly different results; use whatever you have — bleached or unbleached, all-purpose or bread flour, organic or not.

Water: Water has been called the primordial ingredient. Water is essential — more essential than either salt or yeast. Water is the catalyst that helps the dough ferment, because it gives life to the sleeping flour.

Yeast: There are two basic kinds of yeast: commercial yeast, which is made in factories and yields predictable results, and natural yeast (sourdough or levain), which is in the air in thousands of forms and is only predictably controlled under the most guarded conditions. Commercial yeast allows us to make breads in a straightforward, three- or four-step process. For new bakers commercial yeast is the best place to start.

Salt: Salt brings out the natural flavors of the wheat and other ingredients in the bread. Its chemical function is to control the fermentation. Salt will actually tighten the gluten so that it will hold onto itself in an elastic network and enable the dough to entrap the carbonic gases that cause bread to rise. Salt has a marked effect on the texture and the color of the crust. Salt also helps in the retention of moisture. Sea salt is preferred because it has trace minerals. In most simple recipes salt should be about 2 percent of the ingredients. This breaks down to one tablespoon of salt to six cups of flour.

Spent Grains: When all-grain brewers or extract brewers who steep specialty malts complete their sparge or rinse, they are left with a pile of cracked, malted grains and husks ready for the trash bin or the compost pile. These spent grains, particularly the wheat and barley, can be added to your bread as adjuncts (everything added to bread beyond its four basic ingredients can be considered an adjunct). While "adjunct" may have a somewhat negative connotation in the homebrewing community, adjuncts are definitely not bad. Maybe "natural improvers" would be a better term for these ingredients, because they add flavor and enhance the texture of any basic bread recipe. The mashing process removes the malted grains' starches and sugars, but the spent grains still offer nutritious fiber and protein.

Baking Your Bread

It is easy to bake bread using the four ingredients. The recipe for basic French bread is simple. All serious bakers and cooks (and brewers) should have this recipe for regular French bread in their repertoire. By making this bread three or four times, anyone should be able to alter it to produce an individual, subtle version of this classic daily bread.

The French call this recipe Pain Ordinaire, a classic yeasted French bread. It makes two 10-ounce baguettes and one 1.25-pound round loaf.

Ingredients:

- 2 packages active dry yeast
- 2.5 cups water
- 6 cups flour (organic or all-purpose)
- 1 tbsp. salt
- 1 egg white whisked into 1/2 cup cold water for glaze

Step by Step:

Proof the yeast by stirring it into one cup of warm water (115° F). When

Basic Spent-Grain Bread

This bread keeps well and makes excellent toast!

Ingredients:

- 0.25 cup warm water
- 2 packages bread yeast
- 1 tbsp. granulated sugar
- 2 cups warm milk (room temperature)
- 2 tbsp. butter or vegetable oil
- 1 tbsp. salt
- 1 to 2 cups spent grain (dried and finely ground)

Step by Step:

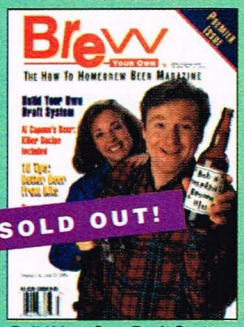
Pour water into a large bowl and add yeast and sugar. Stir until dissolved. Wait five to 15 minutes until mixture is foamy (if bubbles do not form, start over with fresh yeast). Add milk, oil, salt, and grain. Begin to add flour, one cup at a time, and mix. When dough is too stiff to mix, lay out on floured surface (a wooden board works best) and knead the dough, adding flour little by little if the dough is sticky. Knead until the dough is satiny smooth, about eight to 15 minutes.

Place the dough into a greased bowl, cover with clear plastic wrap, and let rise until it doubles in volume (one to two hours). After the dough has risen, punch it down, turn it over, and let it rise again until doubled in volume (about one hour). Finally, turn the dough out onto a floured surface and divide into two sections. Knead each piece briefly and shape to fit into the bread pans. Let rise until bread reaches the top of the pans, about 45 minutes to 1 hour.

Bake bread for 35 to 45 minutes in oven preheated to 375° F (190° C). The bread is done when the top is nicely browned and the loaves sound hollow when gently tapped. Set bread on racks. After cooling 10 minutes, turn bread out from pans. Let cool before slicing, if you have the willpower!

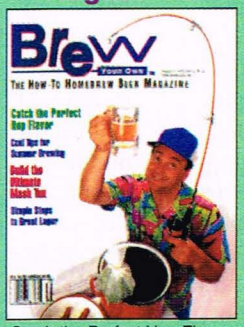
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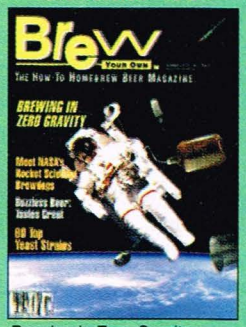
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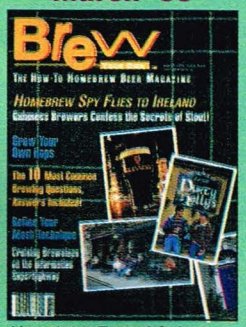
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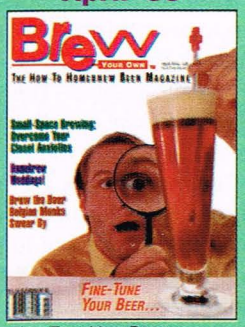
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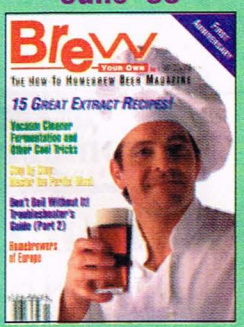
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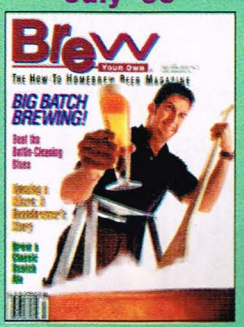
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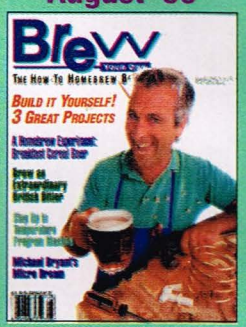
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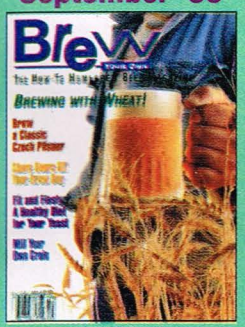
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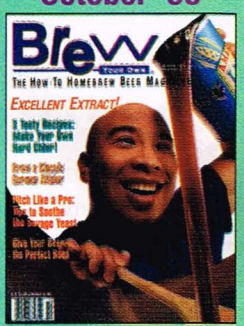
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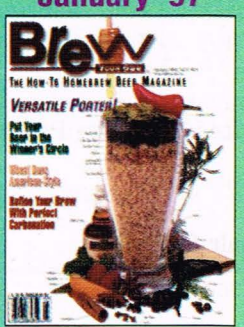
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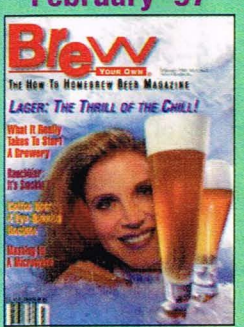
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the mixture is creamy (about 10 min.), pour it into a large mixing bowl and add 1.5 cups of lukewarm water.

Start adding the flour handful by handful, stirring after each addition, at first gently and then vigorously, with a wooden spoon. As the batter becomes thicker, it will also become more elastic. You are actually trying to create strands of dough much like taffy that extend from the spoon to the dough in the bowl each time it is whipped in wide, slow, sweeping motions.

After all but one cup of flour has been added (this will take about 10 minutes), turn the dough out onto a work table, sprinkle the salt over the dough, and knead it for about five minutes while adding the rest of the flour.

Because the dough has been whipped up vigorously in the batter stage, it will not have to be kneaded as much in the dough stage. The dough should be moist and satiny. Place the dough in a bowl large enough to accommodate its doubling in volume. The bowl can be greased or ungreased as you prefer.

Cover the bowl with a moistened dish towel and let the dough rise in a warm spot, out of the way of drafts, for 1.5 to two hours or until it has doubled in volume. Punch the dough and let it rise again for another 30 to 45 minutes.

Divide the dough into two pieces, then divide one of the pieces in half again. Round the three pieces of dough into tight balls. Cover the dough pieces with a cloth so the outside does not crust over, and allow them to rest on the table for 15 minutes.

Shape the two small pieces of dough into baguettes by flattening each piece into a rectangular shape that measures approximately six by three inches. With the six-inch side toward you, fold a third of the dough over (down from the top) and then seal the edge with the heel of your hand. Do this two or three times until the piece is in the shape of a log of about eight inches long. Stretch each loaf out by rolling it on the table under the palms of your hands until it is between 12 and 14 inches long. Place each on a baking sheet that is greased or lined with a parchment paper.

Shape the larger piece into a tight, round loaf by first flattening it and then folding the outer edges over into the middle. Seal each fold by pressing the dough with the heel of your hand. Repeat the process of folding the dough four or five times. With the folds underneath, drag the round ball of dough across the work table with some pressure on top, forming a tight loaf without any air bubbles. Place it on a baking tray lined with parchment paper.

Let the loaves rise, covered, for 45 minutes to an hour, until they have doubled in volume. With a razor blade slash each loaf four or five times, and then glaze with the egg-white mixture. Bake the baguettes for 20 to 25 minutes and the round loaf for about 40 to 45 minutes. When they are done, the loaves will look golden brown in color and sound hollow if they are thumped on the bottom.

Place loaves on a wire rack to cool.

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Adding Your Grains

Reusing your spent grains is a simple process. Spent grains can be used in any bread recipe and can amount to 10 percent of the weight (or volume, depending on the measure you're using) of the flour without encountering problems. It's possible to use a portion of spent grains amounting to as much as 20 percent of the portion of flour, but that's the maximum that can be reasonably used.

Spent grains can be used the day that they are removed from the mash or up to four days after the mash if they are refrigerated. You can also dry them to store them longer.

If you are using the spent grains fresh from the mash, be sure to compensate for the water content in the grains. You can figure 75 percent of the weight (or volume) of the fresh grains is water. Reduce the amount of water or liquid in the recipe by that amount.

The texture the spent grains add to the bread will depend on how finely you grind the grains. Because a lot of the flavors and body of the grain has been taken in the wort, combinations of grain can be used interchangeably with only slight differences in flavor. There are extreme exceptions to this, though. The darker roasts and chocolate malts will dominate and give off a burnt taste that may or may not be acceptable in some bread recipes. Look for these characteristics in grains:

Pale malt: Two- and six-row malts give the unique spent grain taste to any bread formula.

Vienna: This grain will add a slight amber color and a malty flavor to the bread.

Munich: This malt gives a slight nutty flavor and some aromatic notes to the bread.

Chocolate: This spent grain will give the bread a pungent, roasted taste and a dark color.

Crystal: In the spent form this grain will add a slight nutty flavor and a little color to the bread.

Cara-pils: This malt will add a slight nutty flavor to the bread but will not affect the color.

Pain Ordinaire With Spent Grain:

Ingredients:

- 2 packages yeast
- 2 cups water
- 1 cup fresh spent grains (wet)
- 6 cups flour
- 1 tbsp. salt
- 1 egg white whisked into 1/2 cup of cold water for glaze.

Note: If you are using dried spent grains, use 3/4 cup of grains and increase the water to 2.5 cups.

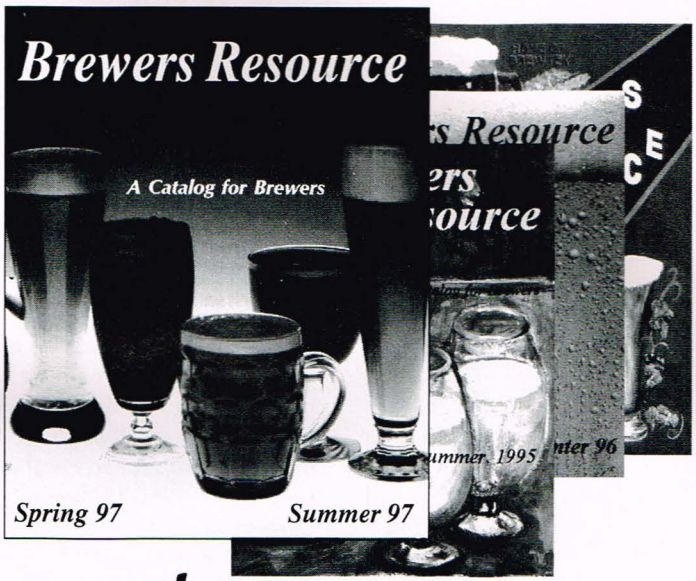
Step by Step:

Use the same step-by-step instructions for the regular Pain Ordinaire, adding the spent grains with the water.

Use this recipe as a starting point for further experimentation. ■

Dennis Midden is an owner of BrewBakers, a brew-on-premise and bakery specializing in spent-grain bread in Huntington Beach, Calif.

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Beat Yeast Bite



Yeast bite is one of those homebrewing terms that you hear from time to time accompanied by the stern warning to avoid it in your beer. But ask someone to describe yeast bite and you may hear the answer, "Well, it's yeasty, like the bite of a slurry of yeast."

We've all had excellent brews that had a noticeable "yeasty" character. Perhaps in subtle aromas and flavors of freshly baked bread. Or in the unique, mouth-filling, chewy experience of a good, cloudy hefe-weizen. Or in the yeast-induced complexities of a Belgian ale. So what exactly is yeast bite? What does it smell like, taste like, and how does it get into your beer?

Yeast bite is a term that describes a number of different undesirable flavor and aroma characteristics that are directly related to the type of yeast used and the manner in which it is used. The flavors and aromas associated with yeast bite have been described variously as smelling like rancid fats (cheesy, soapy, pukey) or beef or chicken soup or bullion, tasting of fatty acids, rotten, having a rubbery or sulfury stench, and imparting a sour, bitter taste to beer.

The American Homebrewers Association's beer scoring sheet, used at homebrew competitions around the country, makes its mention of the characteristic under the simple heading "Yeasty," which it describes as, "yeast-like flavor. Often due to strains of yeast in suspension or beer sitting on sediment too long."

Though there is a range of definitions of yeast bite, perhaps the AHA's

by Nico Freccia

simple description is the closest. It seems that yeast bite is a phenomenon that falls into two categories: that which is caused by live yeast in suspension in your beer and that which is caused by dead yeast in sediment.

Live Yeast in Suspension

In contrast to the aroma and flavor of freshly baked bread, imagine, or better yet taste, the flavor of freshly prepared yeast slurry, dried yeast, or yeast tablets, or pick up a container of the B complex vitamins, an approximation of yeast flavors. None of these are altogether pleasant. Excessive amounts of live yeast that remain in suspension in your beer during both fermentation and bottle conditioning might cause this flavor to come through. Different strains of yeast will have and produce



different flavors and will behave or misbehave depending on their fermentation temperatures.

During fermentation all yeasts will flocculate, or clump together, and settle to the bottom of the fermenter. Different yeast strains, however, have different tendencies to flocculate. Some yeasts may clear completely from the beer after primary fermentation while others will stay suspended for much longer.

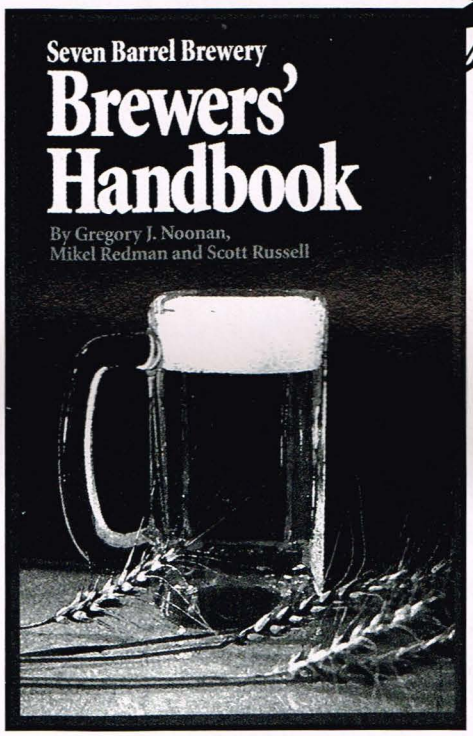
Some hefe-weizen brewers, for example, choose a strain that has poor flocculation tendencies, thereby resulting in a beer that remains cloudy through the fermentation process and into the mug. These strains are carefully chosen and have flavor characteristics that complement the grains and hops used to produce a beer with a crisp, fresh, and slightly yeasty flavor.

In other types of beers, however, poorly flocculent yeast may taste harsh or bitter and detract from the beer's quality. If, after primary fermentation is complete, your beer remains cloudy and the yeast doesn't appear to be dropping, you may have a poorly flocculating yeast strain.

You can remedy this problem in two ways. The first is as simple as changing yeast strains: Ask your supplier for a more flocculent strain. The second is by inducing the yeast to drop out of suspension more rapidly before bottling. The easiest way to do this is to lower the temperature of the fermentation vessel. The colder the temperature, the faster yeast will drop from solution. An alternative is to rack the beer off the sedimented yeast and let it stand for several more days in a second fermentation vessel.

Another cause of yeast bite in your homebrew might be overpitching, or adding too much yeast to the fermenter at the start of fermentation. This will not generally be a problem for homebrewers, unless they are getting yeast from a local brewery and pitching an amount of pure slurry that is far too great. Overpitching yeast will result in much more yeast in solution that could break down to give yeast-bite flavor. Two dried yeast packets or yeast from a smack pack is adequate for a five-gallon batch, but culturing the yeast up into a one-pint starter will supply a better number of healthy cells. In any case a normal pitching rate (2.5 to three ounces of pure, healthy slurry for a standard five-gallon batch) won't give rise to yeast bite if proper handling after fermentation follows.

Length of fermentation and fermentation temperature are also important yeast-bite considerations. A fast, warm fermentation racked immediately into bottles will leave lots of yeast in suspension in the bottles and will also result in a thicker layer of sediment as the beer matures. Keep your fermentation temperatures well within the range for the style you are brewing, allow the yeast to settle for several days after primary fermentation, and rack the beer into another container, if possible.



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Dead Yeast: Autolysis

At the end of fermentation, when most of the yeast has settled into a hard pack of sediment, some of the cells will begin to die and undergo a process called autolysis. Autolysis is probably the single most important contributor to yeast bite. "Lysis," the dissolution or disintegration of the cell, coupled with "auto," self, basically means "self-destruction." Simply put, when yeast cells die at the end of fermentation, the yeast's own enzymes begin to digest the yeast cell itself. This process releases all kinds of nasty compounds into the beer, including fatty acids and sulfur- and nitrogen-containing compounds that cause the aromas and flavors described above as meaty, rubbery, and sour.

Autolysis does not occur immediately after sedimentation but rather is a gradual process. Temperature plays a large role in the rate of yeast cell decomposition. The type of yeast and the yeast's overall health will also contribute to the rate of autolysis. If you have been experiencing possible yeast bite in your beers, here are some things to try:

Rack your beer. After primary fermentation is complete, let the yeast settle, but don't leave it sitting on the yeast sediment for too long (more than about a week after primary is complete is too long).

Control the temperature during all stages. Heat will rapidly accelerate the autolysis process. Keep the fermentation and conditioning temperatures down and store the bottled beer in a cool place.

Remove as much yeast prior to bottling as possible. More yeast means more autolysis and nasty flavors.

Autolysis in Bottle-Conditioned Beer

While removing beer from a sediment of possibly decomposing yeast is very important before bottling, it is less important in the bottle. Although the same breakdown occurs, physical conditions in bottle-conditioned beer are very different from conditions in the fermenter. Most likely, all yeasts will autolyze given enough time.

In the fermenter there is a large volume of yeast contained in the sediment pack, and most homebrewers ferment their beer at warm, ambient temperatures. Once the beer is racked off the yeast and bottled, however, there will be a substantially smaller volume of yeast in the bottle that could be subject to autolysis. Furthermore, most homebrewers store some, if not most of their beer in the refrigerator. Cold temperatures will inhibit yeast decomposition and prolong the life of the beer.

It seems that stronger beers, such as barleywines and other beers that contain yeast in the bottle and are capable of prolonged storage, suffer less from the effects of autolysis. This is probably due to a number of factors that include the presence of esters and higher alcohols that might tend to mask any characteristics of autolysis. ■

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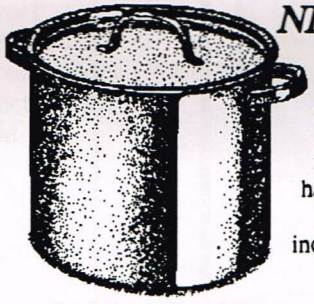
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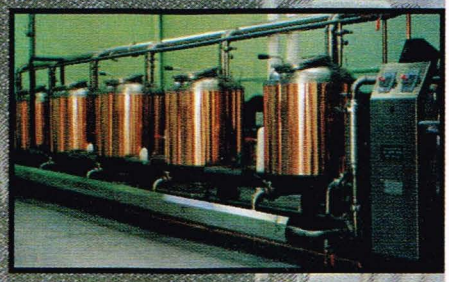
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Pump It Up!

Reduce your chilling time by adding a simple submersible pump to your wort chiller.

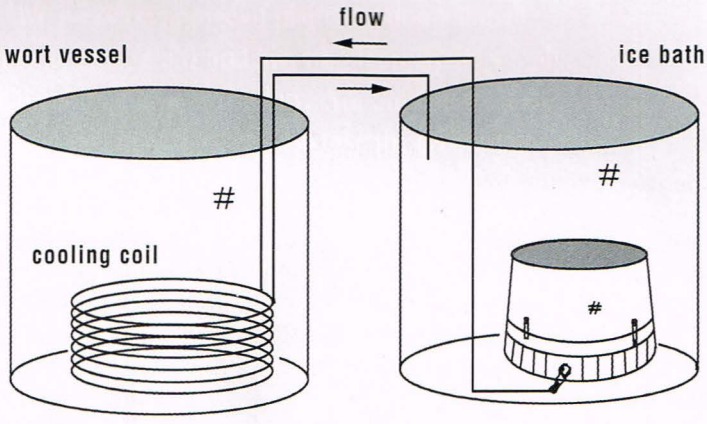
by Stephen R. Galante

Pumps make great tools for brewers. They can save labor and time, and let's face it, adding a pump is a great way to trick out your system.

Commercial brewers use large, expensive pumps to move huge amounts of liquid from the mash tun, into the kettle, through the wort chiller, and into the fermenters. But size isn't everything. Smaller varieties can be helpful in certain aspects of homebrewing. Here's a look at a few ways to use pumps in your brewing setup.

Recirculating Wort Chiller

Homebrewers have had great success with various wort-chiller designs,



Wort Chilling Setup

including the garden hose tube-in-tube heat exchanger (counter-flow chiller) and the immersed coil. However, these designs are usually single-pass or "once through" setups, where the water passes through the chiller once and is discarded. This can be wasteful, it can generate spills, and it can be inconvenient for homebrewers living in apartments.

Pumps can simplify immersion wort chilling applications (Wort Chilling Setup, page 49). In this compact setup a submersible pump placed in an ice bath is connected with flexible tubing to a copper coil immersed in the vessel of hot wort. The submersible pump recirculates cooling water from the bath through the coil and back to the bath. The water picks up heat from the hot wort, cooling it down. As long as there is ice in the bath, the water temperature is close to the freezing point of 32° F.

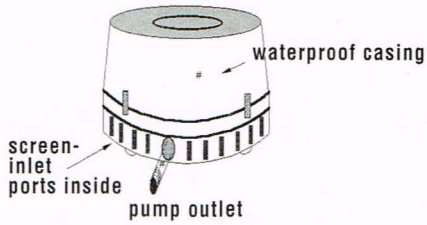
The procedure for constructing and using this type of setup for five gallons of wort is relatively simple.

1. Make the cooling coil. Purchase a length of three-eighths-inch-diameter or one-half-inch-diameter copper tubing, 20 feet or longer. The rotations of the coil are made by gradually bending the copper tubing in several loops around the outside of a coffee can. Leave enough straight tubing length both at the beginning and the end of the coil assembly for tubing runs going down into and up out of the vessel. These straight lengths should be bent upward.

It's important to use a tubing bender to make these 90-degree bends. Otherwise, the tubing will become kinked, reducing the coolant flow rate and making the system ineffective. If you know someone who works in a maintenance shop or is experienced working with copper, let him or her do this work.

2. Purchase a submersible pump (available at hardware stores). Little Giant brand pump models NK-1 or NK-2 are sufficient to provide adequate ice-water flow rates.

3. Connect lengths of clear, flexible tubing to the cooling-coil inlet and outlet. One length of tubing connects the pump outlet to the coil inlet. Another length of flexible tubing sends the coil outlet back to the ice water bath.



Submersible Pump

Clear tubing offers the added benefit of allowing you to see the fluid as it flows. The flexible tubing can be connected to the copper coil with brass compression union fittings, available at hardware stores. If the flexible tubing is soft, purchase "tubing inserts" for the compression fittings. The inserts give the soft tubing support from within, allowing the compression fittings to press down on the tubing, making a tight seal without collapsing it.

Alternatively, make the connections by purchasing flexible tubing with a diameter large enough to slip over the copper tubing. Then secure the connection with hose clamps or with plastic cable ties. However, compression fittings make it easier to connect and disconnect the flexible tubing from the coil. This is important if you want to sterilize the cooling coil by placing it in the pot of boiling wort.

4. Connect the flexible tubing from the coil inlet to the pump outlet. This must be done with a compression fitting. Typically the submersible pumps have a threaded outlet. Purchase an appropriately sized brass compression fitting to connect from the flexible tubing to this threaded outlet. Tubing inserts may be necessary if the flexible tubing is soft.

5. Make the ice bath. A standard five-gallon plastic bucket can be used to hold the ice water bath. Put one-half gallon of water in the bucket. Immerse the pump into the water with the flexible tubing connected to the pump outlet. (The water is needed to prime the pump). Next, put ice on top of the pump, filling the bucket. At least 24 pounds of ice are needed for the job, and the bucket may need to be refilled several times as the ice melts during the wort chilling.

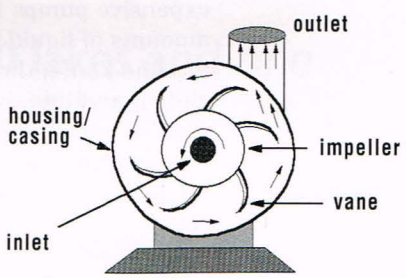
6. Next, place the flexible tube from the coil outlet into the ice bath, so that water recirculates back to the bath.

7. Chill your wort. Sterilize the coil by your favorite means, and place the sterilized cooling coil inside the vessel of hot wort. Plug in the pump and watch as the wort cools. For the first batch, recording temperature readings as a function of time may be worthwhile (say every five minutes) to determine your system's performance.

A typical setup for chilling wort uses a Little Giant model NK-1 pump with a coil made from a 20-foot length of three-eighths-inch-diameter copper tubing. The ice bath uses one-half gallon of water in a five-gallon bucket with 24 pounds of ice. A flow rate of one gallon per minute is attained, and 4 2/3 gallons of wort are cooled from boiling temperatures to 80° F within about 25 minutes. This time could be shortened with more ice, a bigger pump, or tubing of a bigger diameter.

About Centrifugal Pumps

The submersible pump used in this setup is a type of centrifugal pump. Centrifugal pumps are widely used in industry. They are good for transferring large volumes of thin liquids when precise control of flow rates is not the primary concern.

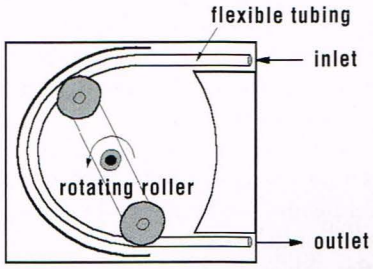


Centrifugal Pump
(cutaway view)

A centrifugal pump is similar to a household fan: Fluid moves under the action of a rotating impeller, which turns at a fixed speed inside a housing. The inlet or suction of the pump is at the impeller center. Fluid at the inlet is sucked into the casing, contacts the impeller vanes, and flows out the outlet at a higher pressure. The impeller is not normally visible, being inside a solid casing.

Centrifugal pumps are simpler in

design than many other pump types but have more requirements for setup and use. They must first be primed, meaning that the inlet piping and the pump housing must be manually filled with liquid. These pumps cannot be run dry and will stop pumping if air enters through loose fittings or through the inlet piping. Fittings on



Peristaltic Pump
(cutaway view)

the inlet side must be sealed properly, and the supply vessel should never be pumped near empty. Since the impeller rotates at a constant speed, flow rate is adjusted by putting a valve on the pump outlet, which may be partially closed to reduce flow.

The vessel feeding the pump should be higher than the pump itself, and the inlet piping diameter should be as large or larger than the pump inlet. When connecting threaded sections of pipe, wrap the threads with Teflon tape (available at hardware stores) to achieve a good seal and prevent air leakage. (Wrap the tape clockwise as you face the threads). Last, there should be no restrictions in the inlet piping. Inlet piping restrictions or air leakage from improper pipe connections can allow air to enter the pump cavity. Under these conditions, or if the vessel cannot supply the fluid fast enough, the pump can be starved. The vacuum created at the inlet can become so strong that the liquid vaporizes inside the pump, thus damaging it. The pump becomes very noisy under these conditions.

Magnetic-drive centrifugal pumps are good for homebrewing. The motor and impeller are coupled with a magnetic (non-contact) coupling, and there are no shaft seals to give leaks or sanitation problems.

Standard centrifugal pumps are not submersible. In the submersible type used in the chiller setup, all electrical connections are waterproof, and a screen mask on the bottom of the pump prevents solids from entering the inlet. The impeller is inside the screen and is similar to that for the standard centrifugal pump.

The greater the pressure that the centrifugal pump works against, the lower the flow rate it can put out. There is a tradeoff: You can have high flows at low discharge pressures or low flows at high discharge pressures. High discharge pressures result when the pump has to work hard to move the fluid. This can result, for example, when using outlet piping of a very long length and/or small diameter, or if there are small-diameter restrictions

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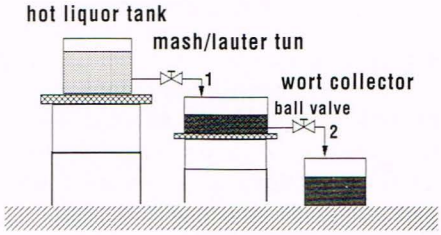
in the outlet piping. For high enough discharge pressures, the flow rate drops to zero, which is called deadheading the pump. Deadheading also occurs when you shut off any valves downstream of the pump. It poses no problems for centrifugal pumps if done for only short periods (less than 30 minutes).

Advantages of the centrifugal pump are reliability and low cost. Magnetically coupled pumps are sold for as little as $60. Disadvantages are that it cannot be run dry, there is no simple adjustment of flow rate, and it must be primed before use.

Submersibles are available from hardware stores. More sophisticated pumps are sold by industrial equipment suppliers such as Grainger and McMaster-Carr and scientific equipment suppliers such as Cole-Parner.

Peristaltic Pumps

Another pump useful in homebrewing is a peristaltic pump, perfect for establishing sparge rate in an



Underletting Mash

infusion mash.

Homebrewers typically rely on gravity to transfer liquids. In a common infusion mash setup grains are sparged by gravity draining hot water from the "hot liquor tank" through the lauter tun, and wort is collected below. Five-gallon batches are usually sparged within 30 minutes, requiring a flow rate of at least 600 milliliters per minute.

One objective during the sparge is to equalize the flow rate of water on top of the grain bed with the wort runoff flow from the bottom of the grain bed. If the runoff is too slow relative to the sparge, the lauter tun may overflow. If the runoff is too fast, the risk increases of a stuck runoff in which the siphoning action of the runoff flow sucks the grain bed in on itself, and the grain bed becomes compacted and impermeable to flow.

Equalizing sparge and runoff flows can be can be difficult with gravity drainage. The flow rate from a given vessel depends on the level of liquid in the vessel, and while the level in the lauter tun is usually constant during the sparge, the level in the hot liquor tank vessel may not be.

And since the flow rate from the hot liquor tank depends on the liquid level inside, the homebrewer must make continual adjustments of the outlet valves in order to equalize the flows.

A peristaltic pump can achieve constant flow rates with a single setting and few or no adjustments. This pump is a type of positive displacement pump. Unlike the centrifugal type, the flow rate is insensitive to inlet and

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outlet pressures over the working pressure range of the pump. The range is specified by the manufacturer and within it, each rotation of the roller assembly pumps a specific amount of fluid.

The advantages of the peristaltic pump are easy cleaning (only the tubing contacts the fluid), simple flow adjustment, and no priming requirements. However, peristaltic pumps are expensive. New pumps with sizes and features useful to homebrewers range from $150 to $400.

A good peristaltic pump choice is the Masterflex 7553-50 pump drive with a model 7021-24 pump head. This is available from Cole-Parmer, a scientific equipment company. Food-grade Norprene or Tygon tubing should be used.

More Uses for Pumps

Centrifugal pumps are ideal for rapid transfer of liquid when precise flow control is not critical. A high temperature centrifugal pump could, for example, be used to transfer hot water from atop a portable burner to a hot liquor tank elevated several feet up in a multi-tier system. This eliminates the hassles and safety problems of lifting large volumes of hot water.

A good pump choice for this application is the Teel Magnetic-Drive Chemical Solution Pump, stock number I P677, available from Grainger.

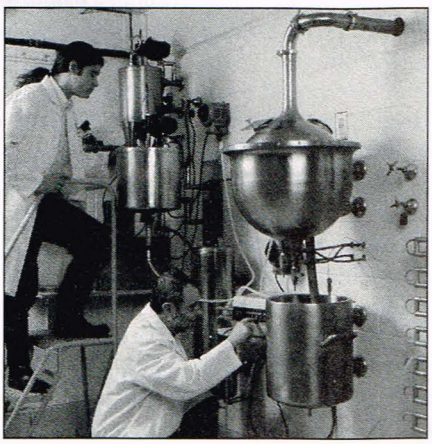
Underletting a mash means to pump water to the bottom of the grain bed. Professional brewing references and popular homebrewing books suggest this technique for fixing a stuck runoff in an infusion mash. For mash vessels with an outlet at the bottom, water is pumped back into the lauter tun through the outlet piping. The water loosens the compacted grain bed by floating it, allowing lautering to continue.

Another use for pumps is underletting a mash. To underlet, simply shut off the valve on the line that runs from the hot liquor tank to the mash/lauter tun, connect a pump to the line running between the wort collector and the mash/lauter tun, then pump hot water back into the bottom of the mash. The peristaltic pump is probably best for this operation. A centrifugal pump might be usable, but it would be difficult to control.

Filtration is used to remove yeast, bacteria, trub, and chill haze from beer or wort. Fluid is forced through a filter with pores small enough to block out these undesirables, and it requires some force to push the liquid through the filter. Homebrew author Charlie Papazian mentions using carbon dioxide gas to pump the liquid from a stainless steel cylinder through a filter. However, using a pump can be a safer, simpler alternative, and a standard plastic vessel can be used instead of a stainless steel vessel. Either the centrifugal or peristaltic pump would be suitable for this application. ■

Stephen R. Galante, when he can spare time away from his homebrewing, is a chemical engineer.

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CIRCLE 53 ON READER SERVICE CARD

Out, Out Damn (Iodophor) Spot

A homebrewer's best resource is often other brewers. Two veterans offer their favorite tips to make your brew day easier, and cleaner.

Sal Emma
Palermo, N.J.

Those of us who have graduated from the school of bottles and are working on post-grad keg systems are familiar with iodophor, used in the food and dairy industries as a sanitizer and germicide.

It's iodine-based. It's blood red, it stinks, and it immediately stains everything it touches rusty red-brown. But keggers use it because it is the sanitizer of choice for stainless steel.

The last time I kegged some beer — a batch of English special bitter — I suffered one of those homebrew kitchen disasters.

Well, near disaster, anyway.

Iodophor is extremely concentrated. It's designed to be added in small quantities to hot water to create sanitizer solution for food equipment.

I was filling the kegs with hot water and had the cap off the iodophor bottle, ready to mix some into the water. Somehow, the flow of water got ahead of me and one keg suddenly threatened to overflow.

Avoiding the flood, I scrambled to turn off the hot water and remove the water hose from the keg. In the confusion I upended the iodophor bottle, spilling much of its contents on the kitchen counter, wall, and floor. Small blood-red splashes were apparent on the table and chairs. Miraculously, none got on my clothing.

I immediately starting sopping up the red mess with mass quantities of paper towels. The counter was wrecked, stained beyond repair.

My wife was home, but in another room. Soon my life began flashing before my eyes, as I imagined her reaction to my redecoration scheme. Not that she loved the counter top, just that she would not be enamored by the thought of spending several thousand dollars replacing it.

As I was contemplating my financial and marital future, figuring out how we were going to swing the repair bill, I grabbed the nearest bottle of cleaning fluid. It was Windex with Ammonia-D window cleaner.

In desperation, expecting nothing, I sprayed the ugly brown stain on the counter top.

It turned black. Now I was really in the stew. I sighed, resigned to my fate. Then, I spotted a few splashes on the floor that I had missed earlier. I bent down to mop them up, then returned to the disaster on the counter top.

The stain was gone.

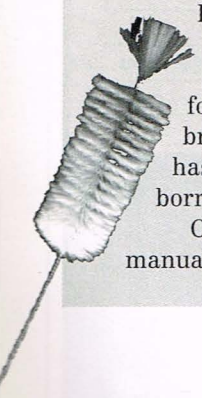
I mean, gone. Like it had never been there in the first place. Some magical, charmed chemical reaction between the iodine and Windex had occurred. It turned black, then simply disappeared into thin air.

Delighted with my new scientific discovery, I quickly sprayed the other spots, on the floor, wall, chair, and table. Instant replay. The iodine turned navy blue, then black, then vanished with the lightest wipe from the paper towel.

I think my guardian angel was a brewer in another life. ■

Do you have a tip to share? Write to Reader Tips, c/o Brew Your Own, 216 F Street, Suite 160, Davis, Calif. 95616.

High-Speed Cleaning Machine



This is my dad's secret and I'll probably lose my secondary fermentor and brewpot privileges for sharing it (Dad has been brewing longer than I and has all sorts of goodies to borrow!)...

Convert your standard manual bottle brush into a multi-speed automatic! Cut off the loop of wire at the end of the brush's handle with wire cutters.

Insert the new end into a cordless screwdriver or drill and tighten the chuck. Now you can power wash your bottles. It saves time and elbow grease.

Emily Wegener
Traverse City, Mich.

Bud, Bud Light, or "That Other Stuff"

by Stan Hieronymus and Daria Labinsky

In the flatlands of east-central Illinois, John Isenhour is living out the dream of many homebrewers — and quite a few professional brewers as well. As brewmaster at Joe's Brewery in Champaign, he gets paid to brew what he wants when he wants. No light beers need fill his fermenters; at Joe's he has brewed Belgian ales and other complex, time-consuming styles.

True, the job doesn't pay much and isn't full-time, but it suits this dedicated homebrewer well.

"It's like I won the lottery," Isenhour says. "It's like having a giant homebrewery."

The first time Isenhour went into Joe's, a little more than two years ago, he asked what kind of beer was on tap. "Bud, Bud Light," the server answered.

"I thought you made beer here," Isenhour said.

"We got that *stuff* over there," the server said, gesturing toward the brewpub's handles, tucked inconspicuously behind taps for megabrews.

Joe's has become better known for its craft beer since then, but it remains a brewpub unlike any other in the United States. It goes against the grain (so to speak) of what they're teaching in "brewpub school" these days.



House beer at Joe's accounts for 10 percent of beer sales.

Joe's is above all a college bar, located literally across the street from University of Illinois fraternity houses. In Champaign-Urbana students are allowed in bars when they are 19 (although it's not legal for them to drink until they're 21), and Joe's has stiff competition for those student dollars. Promotions that all but give away beer, such as quarter-beer nights, have become such a problem that Champaign's mayor has threatened to put a bottom-end cap on beer prices.

The brewpub began life as Chief's Brewing Co., which consciously made an attempt not to be a campus bar and died a quick death in 1991. The current owners took it over in 1992, and for several years employees actually downplayed the fact that beer was brewed there. Despite the quality beer made by former brewmaster Bill Morgan (now at Diamondback Brewing Co. in Cleveland), the beer frequently lingered on tap for several months. Isenhour, who is completing his doctorate degree in informational science at the university, began assisting Morgan soon after his first visit to Joe's and took over as brewmaster when Morgan left in 1995.

Isenhour, 41, has been homebrewing for about 20 years. In 1995 his lambic won third place in the American Homebrewers Association National Homebrew Competition. He still brews at home, in part to culture yeast — at last count he had 17 different yeast strains working.

Isenhour frequently judges at homebrewing competitions and has reached the National level in the Beer Judge Certification Program. Homebrewers may be more familiar with him than they realize. A few years back, he began using stamps with the words "More Malt" and "More Hops" on them when judging, because he

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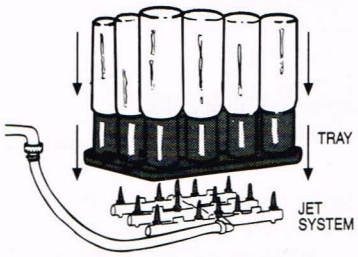
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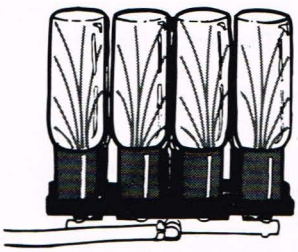
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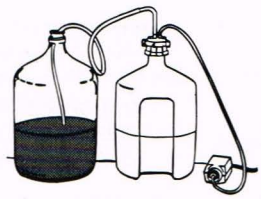
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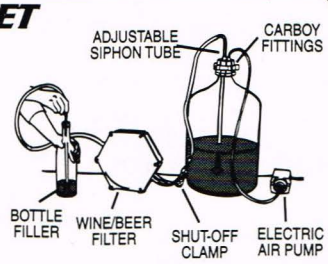
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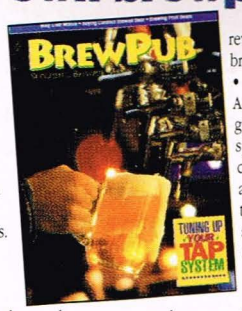
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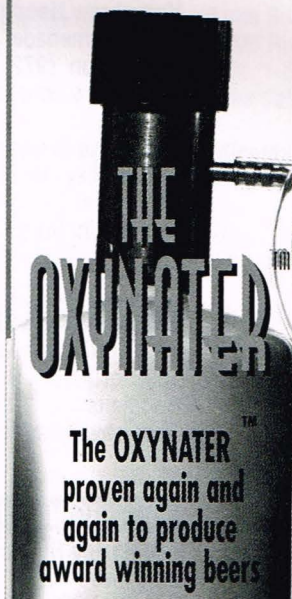
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found these problems so common. From time to time when using the stamps, he has met homebrewers whose evaluation sheets he had once stamped, only to be greeted with "So, you're the ass—."

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Brewmaster John Isenhour and brewer Stephen Bernard expect to brew about 185 barrels of beer this year.

Isenhour now finds himself with complete responsibility for brewery operations, including training and managing assistant brewers, designing recipes, maintaining equipment, preparing monthly Bureau of Alcohol, Tobaco and Firearms and state alcohol tax reports, and controlling inventory. But the schedule is flexible; Isenhour brews about once every two weeks and can fit his other duties in with doctoral work and teaching.

While the pub now promotes the fact that beer is made on-premise, the house beer accounts for only 10 percent of beer sales. "The place floats on cheap beer," Isenhour said. He expects to brew between 170 and 200 barrels in 1997 — that is, if he can keep the equipment in the seven-barrel brewery working. The system was never state-of-the-art. For example brewer Stephen Bernard said, "The brew kettle was made by a company that makes equipment designed to melt metal." Isenhour recently was rebuilding some valves that he described as "antiques."

"We've cobbled things together," he said. "It works pretty well if you keep your eye on it." But finding replacement parts is difficult. Isenhour recalls spending Christmas vacation of 1995 "with the (brewery) totally apart and thinking it wouldn't ever go back together."

Joe's is an extract brewery, but the brewers compensate by using what Isenhour calls a "poor man's lauter tun" — a 45-gallon bucket filled with specialty grains. The brewers suspend a very large grain bag in the container so it cannot touch the bottom. A tri-clamp fitting at the bottom allows them to pump wort into the bottom of the kettle, and about halfway up the kettle is a port that is used for stirring in malt and whirlpooling at the end of the boil. They draw liquor from that to the top of the "sparge-o-matic," making a liquid circuit that runs until all the "worty goodness" is extracted from the grain. Isenhour has introduced up to 150 pounds of grain into the system using this method. "I may never do *that* again," he said.

Bernard came from an all-grain brewery, Duster's in Lawton, Mich., but he sees some benefits to extract brewing. "There's a lot less shoveling out of crud, which I like," he said, laughing. "This encourages you to play more with yeast strains and with hops." Isenhour is a big fan of dry hopping. "We must use more hops than almost anyone, which I'm proud of," he said.

The process works well, for Joe's has turned out highly praised beers. Little Dog ESB won an Award of Excellence at the 1996 Real Ale Festival in Chicago. HopHead Ale, an India pale ale, is appropriately named

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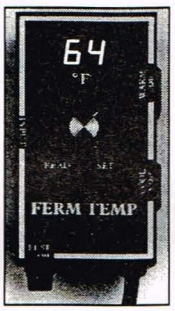
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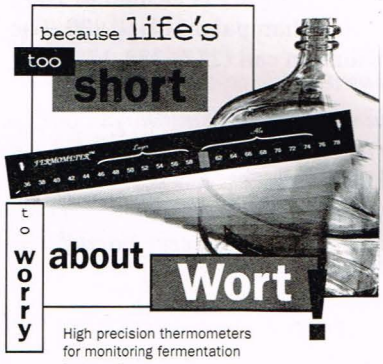
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and doesn't embarrass itself next to Sierra Nevada Celebration Ale. Academic Ale Ordinary Bitter shows incredible depth for a beer that's about 4 percent alcohol by volume.

"We can come surprisingly close (to all-grain) by blending different types of malt and using fresh malt and a lot of adjuncts," Isenhour said. Both the HopHead and Academic start from a base of several powder and liquid malts. The HopHead is hopped with Centennial and Willamette, the Academic with English Fuggle, Goldings, and Willamette. Of course, both are heavily dry hopped.

Joe's also has featured brown ale, porter, and barleywine, plus more esoteric styles such as witbier, gueuze, and a tripel called Danger Ale. Isenhour tells a story about farmers from the surrounding rural area coming in to order "the Belgian lemonade" when the gueuze was on line. Isenhour's goal is to keep on three beers at all times, but equipment problems have made that difficult. Academic Ale is the beer available most regularly.

The management gives Isenhour free reign over all aspects of the brewery. He can choose which beers he wants to brew, select the ingredients he wants to use, and decide how long he wants the beers to condition. Some breweries push out ales in a little more than a week, but at Joe's no beer goes on line before it's a month old.

Joe's serving tanks are usually 36° to 38° F and sometimes dip as low as 33° F. This is fine for the mainstream lagers on tap, but the English-style ales fare better served in the 50s. The colder temperature "makes them taste more bitter than they should," Isenhour said. "Instead of adjusting my recipes, I just tell people to buy two beers at a time, and the second one will be right."

Although it's a college bar, Joe's is not a campus dive. The brewpub is spacious, with a dance club featuring a deejay, and room upstairs for private parties. Pool tables fill one section on the main floor, and university sports photos decorate the walls. The brewery equipment is in an attractive glass-enclosed atrium. Joe's food menu emphasizes appetizers such as nachos and fried cheese, as well as sandwiches and burgers.

The waitstaff is learning about the beers and how they are made, but some patrons still don't realize that beer is brewed there. A few even think the equipment is for decoration; Isenhour recalls hearing a patron say of the brewery, "That takes up a lot of room for a showpiece." The regulars who favor the brewpub's own beers know to visit during the afternoon and early evening. Arrive late at night and you may find a youth throwing up light beer, a bit of unpleasantness the authors once witnessed there.

Joe's is a brewer-friendly place. Isenhour gives yeast away to homebrewers and will gladly talk about brewing beer when he's not too busy. He'll flip open his black book and share recipes. "Some people are very proprietary about their recipes," he said. "I like this beer. If everybody made beer like this, I could go anywhere and drink the beer. It would be great."

Isenhour realizes that the blessing is also the curse, that Joe's student-heavy clientele would never support his beer alone. "It would be Chief's all over," he said. But he's not complaining. As he put it, "Where else can I work where I don't have to make light beer?"

Joe's Brewery is located at 706 S. Fifth St., Champaign, Ill. 61820. For information call (217) 384-1790. ■

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

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Brew Interactively

Beer CD-ROM

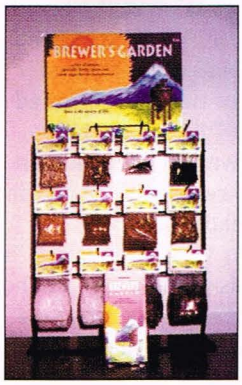
CyBeer, an interactive guide to homebrewing, is a CD-ROM that provides video demonstrations of extract and all-grain brewing, sanitizing, and bottling. It comes with an equipment guide, ingredient guide, glossary of brewing terms, and style guidelines. It also includes an expandable database of more than 200 original recipes.

The program requires Windows 95, eight megabytes RAM (minimum), 2x or faster CD-ROM drive, and 10 megabytes of disk space. A version for Macintosh is being developed.

Call 1-800-450-9535.

Brew a Garden

Brewer's Garden Specialty Brewing Herbs & Sugars supplies include bitter Curacao orange peel, sweet orange peel, ginger, cardamom, licorice root, sarsaparilla, and other hard-to-find products such as sweet gale and paradise seed.



Belgian candi sugar is available in clear, amber, and dark. The sugar diamonds come without strings, making straining unnecessary.

Call Steinbart Wholesale at (503) 281-3941 or L.D. Carlson Co. at (216) 678-7733 to order or for information.

Enlarged Coopers Cans

Coopers Malt Extract cans are now available in larger sizes for the same price as the old 3.75-pound cans. The new four-pound cans are available in all six Coopers varieties: Lager, Draught, Real Ale, Bitter, Stout, and Classic Old Dark Ale.

Coopers is distributed in the United States by Crosby & Baker, F.H. Steinbart, G.W. Kent, L.D. Carlson, and Vinotheque USA. It is available in Canada through Distrivin Limitee, Vinotheque, Lindstrom Beer & Wine, Niagara Vine, and Spagnol's Beer & Wine.

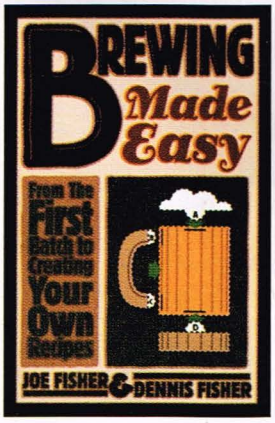
Call 1-800-368-9363.

New Briess Malts

Briess Malting Co. is offering domestically produced pale ale malt and two-row caramel malt (available in 40°, 60°, and 80° Lovibond). Both the pale and caramel malts are malted from the Harrington barley variety. The pale imparts a rich, malty flavor complimentary to most beer styles. The two-row offers a smooth caramel flavor and natural red color to brews. They are available at homebrew shops.

Brewing Made Easy

Brewing Made Easy, from Storey Publishing, provides beginning brewers with the bare facts of brewing. Included in the 96-page book are directions, 25 recipes, simple charts, a glossary, and a recommended reading list. The authors are Joe and Dennis Fisher. Visit Storey's Beer Page at www.Storey.com.

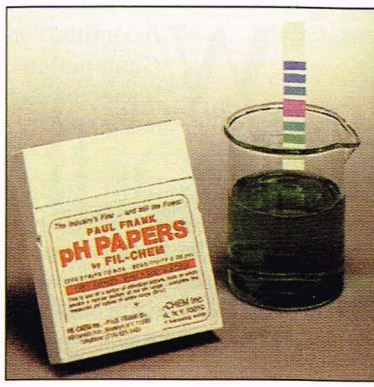


Call (802) 823-5200.

Measuring pH

Fil-Chem's pH Papers can help all-grain brewers who need to test the pH of their mashes. The papers come in many ranges, including 5.1 to 5.4.

Simply dip a test strip into the mash and compare the center control bar to the indicator bars for fast, easy, and completely accurate results. Test strips come in boxes of 200 strips each and are available directly from the manufacturer.

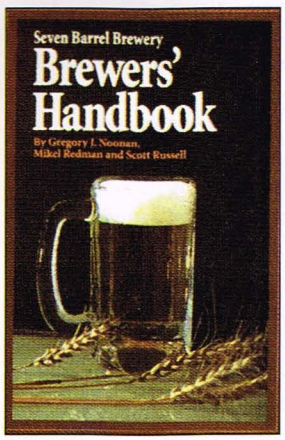


Call (718) 625-3400 and ask for #3855.

Brewers' Handbook

Seven Barrel Brewery Brewers' Handbook teaches beginners how to make superb beers with minimum effort. It is ideal for those who want to advance from first brew to all-grain.

The handbook features step-by-step instructions on making everything from Dartboard Pale Ale to Rocktoberfest Lager to R.I.P. XXX Stout and includes more than 130 recipes. It's authors are Gregory Noonan, founder of The Seven Barrel Brewery in New Hampshire; Mike Redman, the original head brewer at Seven Barrel; and Scott Russell, who runs The Seven Barrel Brewery's homebrew shop and is BYO Recipe Exchange columnist. The book is published by G.W. Kent and is available through homebrew retailers. ■



Divine Intervention Required

by Craig Leisher and Tom Boice

"What's this?" asked the Guatemalan customs inspector as he held up a bag of crystal malt.

"I have special dietary needs," I explained (read: homebrewing in Guatemala is illegal). I rationalized that I did have certain dietary needs because there is no way one can drink the local beer, Gallo, and keep the taste buds alive. Guatemalan beer is tasteless. After a near-death experience from the boredom of drinking Gallo one evening, my neighbor Tom Boice and I decided to try brewing our own beer.

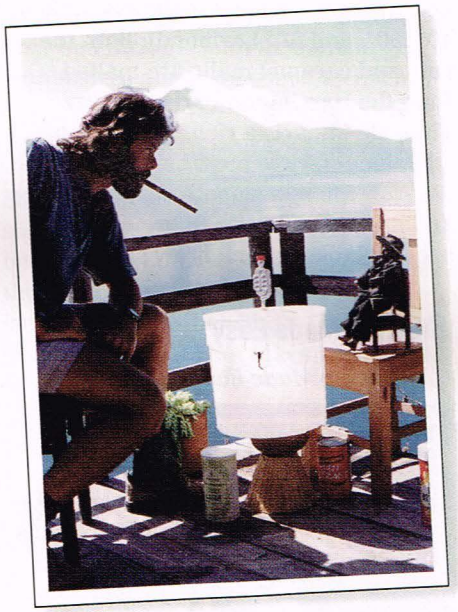
While back in the United States on business, I bought a starter kit, packed it in my luggage, and returned to Guatemala. Getting the ingredients and equipment past customs proved to be the easy part. As we soon discovered, brewing beer in Guatemala is hazardous — even with divine help.

The tap water in our neighborhood is a biological menagerie of disease and contagion. As a result, we used the local bottled "spring water." Everything went fine, except the yeast never started fermenting. "Must have been bad yeast," we reasoned, and pitched a fresh batch. The new yeast died a silent death as well. We threw the wort out after two weeks of wondering what went wrong. We found out later that the "spring water" had chlorine in it, and chlorine kills yeast.

We made our second batch with filtered and boiled local water. We used malt extract a friend had brought down from the United States. Unfortunately, our friend also brought down a six-pack of great beer. Somewhere between drinking beer and making beer, we failed to notice that the extract was unhopped. When we tasted the batch a month later, it was a brown ale with no hops and fit only for late night, nothing-else-in-the-fridge drinking.

By now our local friends had confirmed their suspicions that these crazy gringos have so much money and time that they waste it trying to brew beer when Gallo is only 40 cents a bottle. We needed a success.

Tom and I hedged our bets by seeking divine help. We asked the Mayan saint of drinkers, smokers, and prostitutes for help. Maximon is a foot-high statue dressed in black with a cigar in one hand and money in the other. He has a fondness for fast living and good beer.



Tom Boice and Maximon, the Guatemalan god of life in the fast lane. That's a scorpion crawling up the fermenter.

We gave Maximon a sip of our hopless brown ale so he could taste the potential. Though the beer dribbled down his face, his eyes gleamed. With Maximon's help, we knew the next attempt would be stellar.

Our third brew will forever be known in local legend as the Book Ale. For this batch we were extra careful and sober. We followed the recipe perfectly, used chlorine-free water, tested the yeast, and added lots of hops.

The day we planned to bottle the beer, Sidney Bigman loaned me a copy of his most recent book. Bigman is a Canadian who now lives in Guatemala and writes philosophical novels on things such as the Gospel of Matthew as a guide to the world today.

When we were looking for something heavy to put on the lid of the brewing bucket to hold the siphon hose down, I reached for Bigman's tome. He was right, the Gospel of Matthew did in fact prove useful in today's world. But when we were repositioning the siphon, the lid tipped, and the book plunged into the beer. "Oh my God, the book!" exclaimed a brewing neophyte watching the proceedings. "Forget the book! What about the beer?" Tom answered.

I returned the book several days later, telling Bigman that the book had been "instrumental" in helping bottle our beer. Though we were brewing an IPA, we decided to reclassify this particular batch as a "read" ale.

Two weeks later we had our first taste. The beer was quite drinkable, but it lacked body. Perhaps Maximon was peeved that we had let St. Matthew taste the beer before he did and had thus hexed it.

Tom and I recently brewed our fourth batch, but after two days it has still not started fermenting. It did not help matters that someone banged around the fermenter while moving it across the room. We asked Maximon to guard the beer, promising him the first taste this time. With Maximon sitting on the fermenter, no one would dare move it again, and maybe a blending of the brewing art with the Mayan spirits will produce a beer like no other. ■

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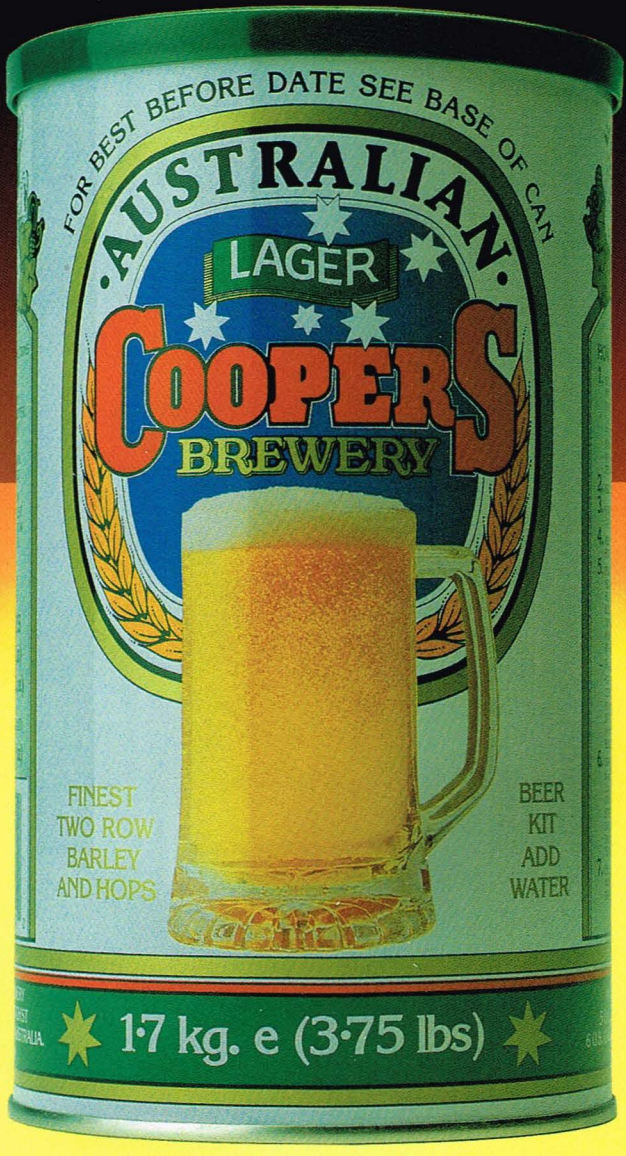
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