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October 1996, Vol.2, No.10
Niche Publications Inc.

THE HOW-TO HOMEBREW BEER MAGAZINE

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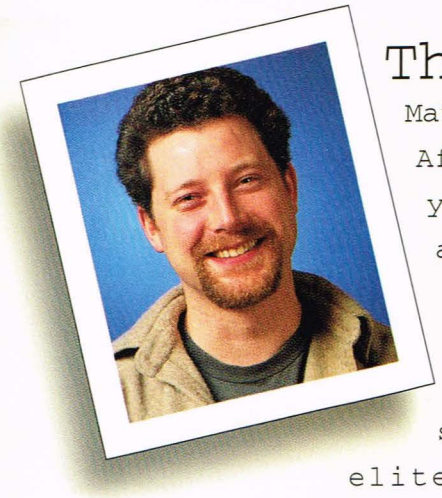

This is Sean. He's our beer guy.

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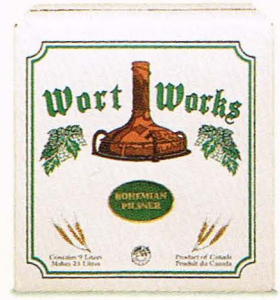

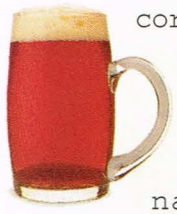

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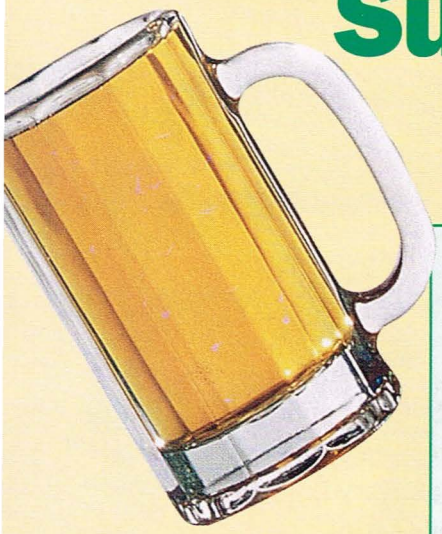

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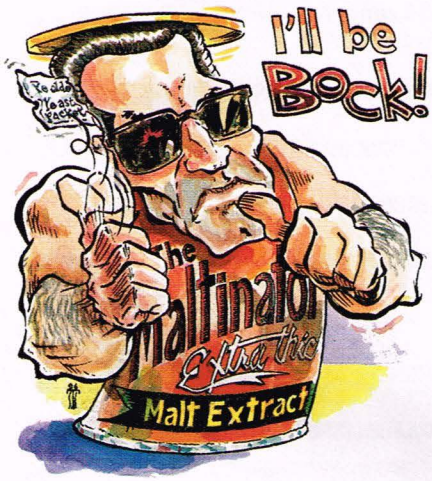

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Cover photo: Kent Lacin

A Homebrew Experiment

This incident happened to me about four years ago. Old news, I know. But stick with me. It will be important later.

A friend of mine really likes good wine. Occasionally when I've gone to a restaurant with him, he's brought his own bottle. At first I thought he was going to smuggle it in, but he would always tell the waiter. The waiter would then pull the cork and pour the wine. We'd be charged five bucks for the privilege of watching.

Well, one time when we went out I got the brilliant idea of bringing some homebrew. There were four of us, so I picked out two 22-oz. bottles, a pilsner and a brown ale.

When we were seated at the restaurant, I pulled out my beer and asked the waiter to pour it for us. To his credit he was very polite, even friendly. He told us they didn't do that for beer, only wine.

I told him that this was special beer, beer I made myself, and I would be happy to pay a corkage fee. He said they had many fine beers on the menu and he was sure I'd like one of those.

No, I parried, this is the one I want.

He fetched the manager. The manager said really, they only did that for wine.

Then I told the manager that my wife and I were celebrating our anniversary and this was a beer I had brewed for our wedding those five years ago.

Okay, it was a lie. Blatant. Brazen. Five-year-old beer? Yuk! You know it and I know it. The manager, he didn't know. He caved. We got to drink the homebrew, and he didn't even charge us cappage (although I had to suffer through six months of abuse from my wife, who decided that my waxing romantic about our wedding was about the funniest thing she had ever heard).

So enough for ancient history.

I bring this up because I recently had the brilliant idea to try this caper again. Homebrewing has become so much more popular and gotten so much publicity in the last few years that I figured things might have changed. I'd take a homebrew to a restaurant again as an experiment. I'd test to see how far we'd come in four years.

Now, this wasn't entirely a controlled study because I didn't go back to the same restaurant, which has long since closed.

So we picked out a new place, about the same price range and clientele as the first place we had gone, and I brought along two 22-oz. bottles. This time they were both pale ales.

When we sat down, I hauled out my brown paper sack. I told the waiter we had brought our own beer. He told me they had an extensive beer list.

So far, no change in four years.

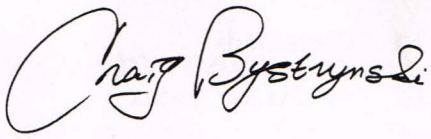
I told him these were homebrews.

He told me, politely, that he had to ask the manager. But he thought because of excise tax laws they weren't allowed to pour homebrew.

This was a new turn, and one I must admit I hadn't anticipated. The manager came. He was friendly. He asked what kind of beer we had. Then he asked if we were having a special celebration. My wife snickered. I bit my tongue and refrained from claiming I brewed the beer for our wedding, now nine years ago. "Just a night out," I said.

He said he was sorry, they didn't do cappage. Nor, it turns out, did they do wine corkage. We thanked him. He told us to enjoy our dinner. Then he sent us a free round of Sierra Nevada pale ale.

The conclusion: Scientific experiments never seem to yield exactly the results we expect. But then, I guess that's why we do them.



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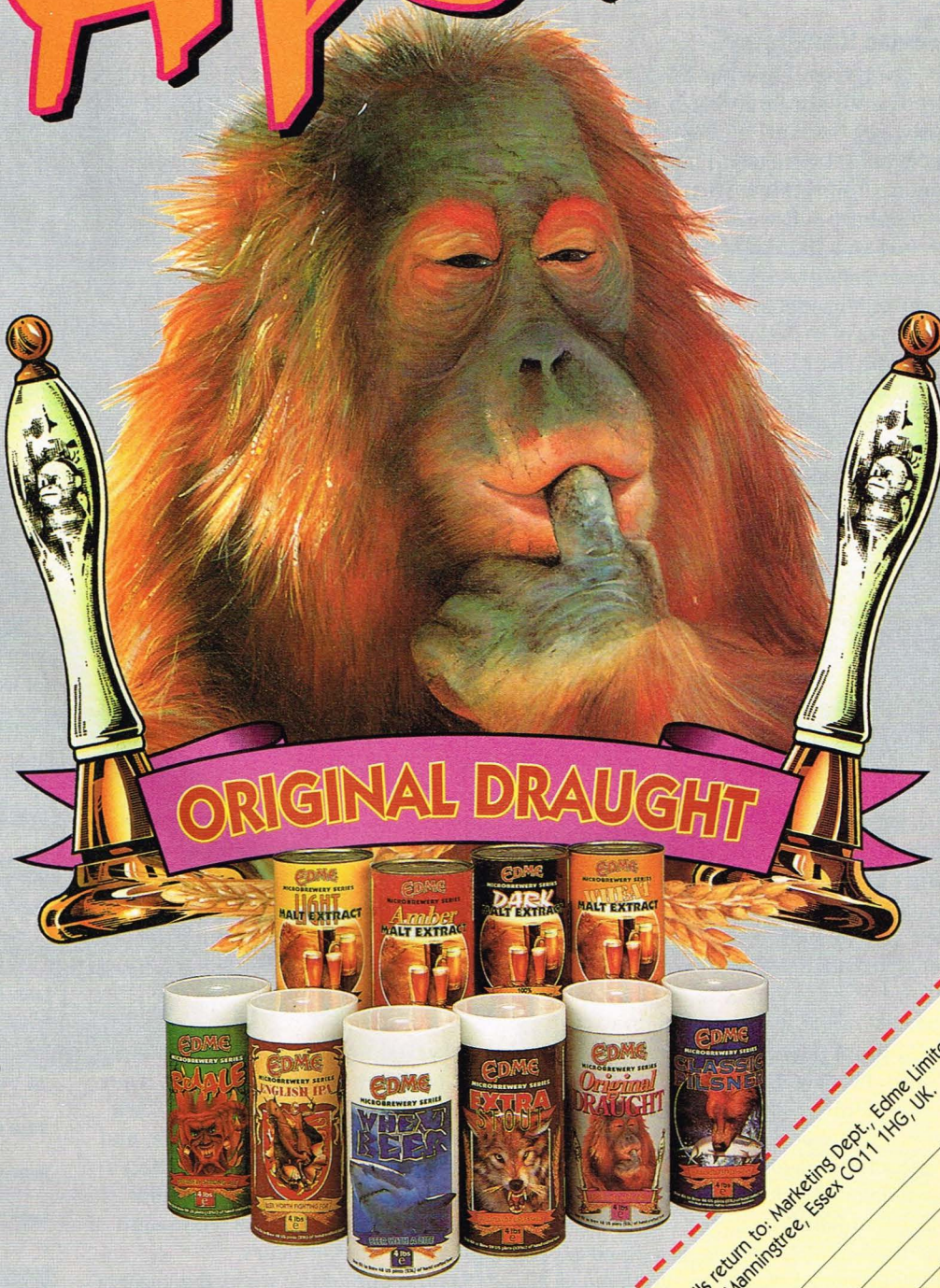

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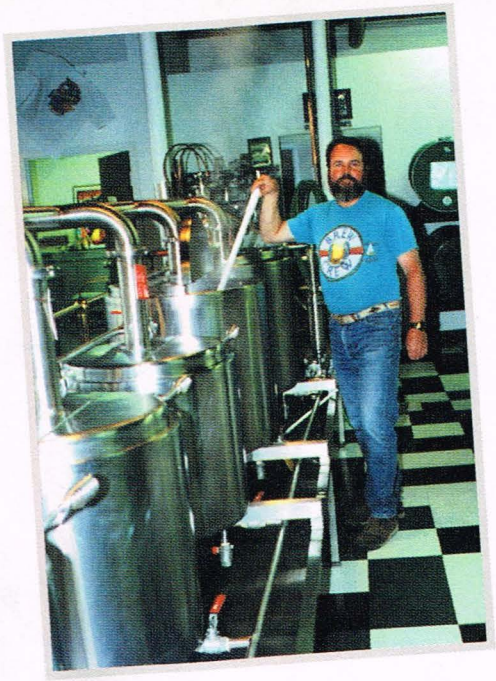
Dennis Brown
Security, Colo.

My Pleasant Hill Brewery in California was featured in the Premier issue of BYO (May '95).

I moved to Colorado Springs four months ago. The house we are in temporarily is not conducive to the setup of my two-barrel system.

My wife and I had to brew our first Colorado batch at a brew-on-premise called Sartey's. I found a neighbor, Al, who is a homebrewer, so we made two 30-gallon batches and split them in half. We made a red ale and a brown ale.

It was a pleasure to use professional equipment. The back-yard brewing will never be the same. I can say I don't miss the clean-up.



Dennis Brown brews in his new (temporary) Colorado digs.

Garden Hose Beer

Ever since I saw the 15-gallon brewpot (featured in Wash N Wear Brewing, October '95 BYO) I needed to have one. One reason I had for building this system was that I wanted to employ a full-wort boil. The other reason was that I could move my brewing outdoors and bond with nature. More important, however, I didn't have to listen to my wife tell me over and over how much she hated the smell of the boiling brew.

Over the span of about two months, I had collected almost everything I would need to test my new brewpot. For Christmas that year, Santa (who must be a beer drinker) brought me a King Kooker and a copper-coil wort chiller. At last I was ready to try out my new system.

It was actually New Year's Eve by the time I was able to try out the beast. What a way to start the year, I thought. So I hauled all of my brewing tools and supplies outside and started brewing. At first I ran into a problem: How was I to get seven gallons of water from an indoor faucet into a pot that was sitting outside the house? Well, simple problems call for simple solutions. I just grabbed my trusty garden hose and ran it from the faucet to my pot. After I overcame this small problem, the rest of the brewing session went off without a hitch.

On bottling day I racked my beer into a sanitized bottling bucket and began filling bottles. The whole time I was bottling, I kept getting a whiff of a strange odor. I sniffed my brew, and sure enough that was the source of the funky smell. The smell seemed quite familiar but, for the life of me, I couldn't put a name to it. Undaunted, I continued filling bottles until all the brew was gone from the bucket.

I let the beer condition for a full three weeks before opening a bottle (I'm not very patient when it comes to aging beer).

The first thing I noticed upon pouring the beer was that it still had that strange, funky, and slightly familiar smell to it. I had remembered reading somewhere that beer could go bad but very rarely became toxic.

Still concerned, I cautiously took a small sip. As soon as the beer hit my tongue I knew exactly what the smell was and how it came to be in my beer. All I could taste was about 25 feet of garden hose. It was terrible.

If you have ever drunk water directly from a garden hose, then you know exactly what my beer tasted like. My New Year's resolution, of course, was to never ever use a garden hose to fill my boiling kettle again.

Although I have gotten quite a few laughs about this incident from fellow homebrewers, it was a sad moment when I had to pour the whole batch, bottle by bottle, down the drain.

Rick Bunker
Austin, Texas

Wedding Wishes

I served my first three homebrew batches at my wedding last year. They were a simple Cooper's ale with dark dry malt extract, a nut brown ale, and a wheaten ale. To be safe I also had a pony keg of Redhook Rye beer (nice, crispy, and light) for folks who might not like my darker beers.

At the end of the night the caterer pulled aside one of the groomsmen to warn him that the pony keg was almost untouched; she'd served only 3 1/2 glasses the whole evening! It was the best compliment I've received so far in my paltry two months of homebrewing.

Steve Hollasch
Redmond, Wash.

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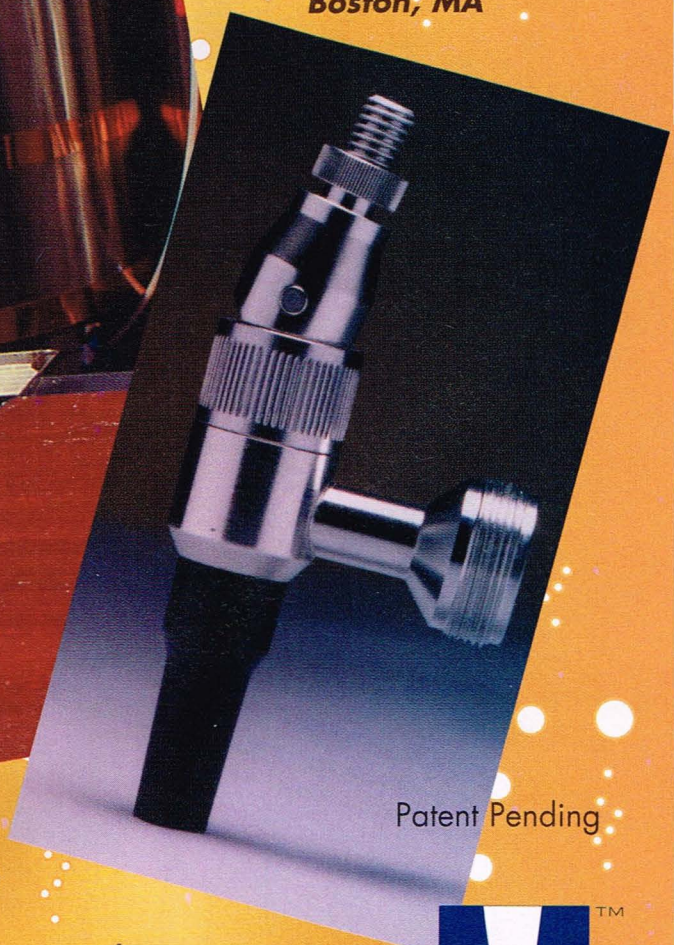

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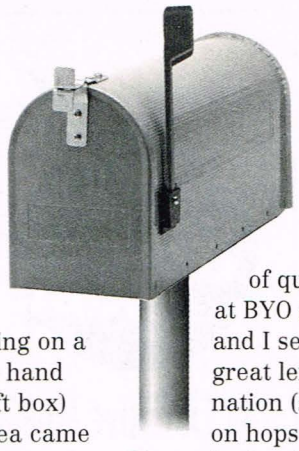

Build-It Ingenuity

Dear BYO,

Your article on the draft box (Homebrew To Go, August '96 BYO) came in handy for my annual softball camping trip. As I was sitting on a rock, with a fishing pole in one hand and a frosty (thanks to the draft box) lemon weiss in the other, an idea came to me (I don't know if I think better fishing or drinking my homebrew). I still don't have a wort chiller. A copper coil is a wort chiller, and I have a copper coil in the draft box.

All I had to do was figure out a way to make it easy to remove the coil from the draft box and install a garden hose and fixture to mount the coil to the sink. I lengthened the output and input pipes so they would extend out of the brewpot and installed quick-disconnect couplings on both ends. I then made up my garden hose and water output hose and, voila: wort chiller/draft box coil.

Joe Versheck
Franklin Square, N.Y.

Make sure the garden hose is new to avoid ruining your beer with a funky taste. See Garden Hose Beer in this month's Pot Shots (page 6) for one brewer's tale.

Orange Blossom *Very* Special

Dear BYO,

I brewed the Orange Blossom Special recipe (15 Great Extract Recipes, June '96 BYO) and found that two ounces of coriander is way too much. It overpowers everything. My homebrew supply colleagues say one-half ounce of coriander is sufficient in most any recipe calling for this spice.

I also found that the high-gravity yeast (Wyeast 1214 Belgian Abbey yeast) is a mistake. A lighter, flowery beer like this should be in the 4 percent to 5 percent alcohol range, not the 7.5 percent I got.

The "After the Gold Rush Amber Ale" recipe in the same issue (Style of the Month) is a keeper.

D. B. Emery
San Diego, Calif.

No More Paranoia

Dear BYO,

I see a great number of questions sent in to you at BYO relating to sterilizing, and I see many people going to great lengths to avoid contamination (such as using Everclear on hops before dry hopping). Please don't misunderstand me, cleanliness and sterilization are very important to me and to brewing great beer.

However, it is not something for people to become so paranoid about that they can't relax and enjoy the art and craft of brewing.

I have brewed several hundred gallons of beer, and I have yet to lose a batch to contamination.

It will probably happen to me someday for I am not perfect — far from it — and that's the point. Take reasonable care and practice good brewing habits. Don't sweat the small stuff.

Jason Boebel
Nitro, W.V.

Lemon Peel Versus Zest

Dear BYO,

This letter is in response to Lawnmower Bier (Recipe Exchange, June '96).

In this article lemon zest is defined as "the white fibrous material inside the peel." The zest is actually the yellow-colored skin on the outside of the lemon.

The "white fibrous material," if used in brewing, will lend a bitter, unpalatable flavor to the brew.

The sour, tart, lemony flavor that he is after is only obtained by using the "zest" as I described above.

I hope this suggestion will save many a homebrewer a headache.

Randy deBeauclair
Ypsilanti, Mich.

Candi Sugar?

Dear BYO,

I plan to try the Abbey Hoffman recipe (Style of the Month, April '96). The recipe calls for 1.5 candi sugar. What is the unit? Pounds or cups?

Also, the article states that candi sugar is becoming increasingly available, but I can't get it. As a substitute I plan to use regular white table sugar but wonder if what is known in these parts as "icing sugar" might be better.

Daryll Sewell
Saskatoon, Saskatchewan

The recipe calls for 1.5 pounds *of candi sugar. If candi sugar is not available in your area, the author recommends substituting 1.5 pounds of white table sugar.*

Correction

Tim Yarrington, who was featured in Tips from the Pros in the August 1996 issue, attended the Master Brewer's Program at the University of California at Davis.

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RECIPES #3

STEAM BEER

Steam beer makes for refreshing sipping at any time of year. Here's a simple recipe that'll be ready in no time. For authenticity, we highly recommend the use of Wyeast #2112 California Lager yeast - culture it up to a pint if time allows.

Ingredients:
7.3lb EDME Microbrewery Series LIGHT Unhopped Malt Extract
1 1/2 oz Northern Brewer hop pellets (45 min)
1 oz Cascade pellet or leaf hops (4 min)
Pinch of Irish Moss
hop sock or hop bag

Recommended yeast: Wyeast #2112 California Lager Yeast

For 5 gallons: Start the Wyeast culture in advance according to package instructions. Bring 1 1/2 gallons of water to a boil, remove pot from heat, add malt extract and stir until dissolved. Return to heat, bring mixture back to a boil then add Northern Brewer (boiling) hops. Total boil time will be 45 minutes.
With 30 minutes remaining, add Irish Moss.
With 4 minutes remaining, add Cascade hops. Sparge/strain the wort into the fermenter along with enough COLD water to make 5 gallons. Cool to 65F then pitch yeast.
Best results are achieved if fermented at or near 65F.
Transfer wort to a secondary fermenter after 2 or 3 days.
Prime and bottle with 3/4 cup of corn sugar when final gravity reaches 1.010 ± 0.002.
Age for minimum of 3 weeks in the bottle.

OG: 1.049, FG: 1.010 ± 0.002

MILES' STOUT

The recipe will produce a sweet, creamy stout with a mild coffee note. Guaranteed to make your friends turn GREEN with envy.

Ingredients:
1 x EDME Extra Stout kit
1 x 3.3lb can EDME Microbrewery Series AMBER Malt Extract
1/4 lb Chocolate Malt
1/4 lb Crystal Malt
1/4 lb Roasted Barley
3 teaspoons Gypsum
1/2 teaspoon Irish Moss
1/2 oz Fuggles or Willamette hop pellets

Recommended Yeast: Wyeast #1056 or EDME Active Dried Yeast

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

OG: 1.055, FG: 1.022 ± 0.002

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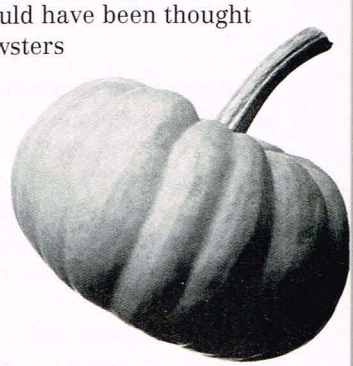
CIRCLE 23 ON READER SERVICE CARD

Herald the Harvest with Pumpkin Pie Ale

by Scott Russell

With all due respect to those unfortunate enough to live elsewhere, I have to say that fall in New England is unique. Our foliage is different, the air is different, the nights are crisp, and of course our seasonal foods and beverages all have a unique flair. Fall in New England means cider season, harvest season, high school and college football season; there is a sense of closure, of putting away for next year (we usually do that for the Red Sox around July, but that's different). Thanksgiving in New England is unique, too. After all, this *is* where the Pilgrims were, and the New England harvest tradition virtually created that holiday.

So what better way to remember the first harvest by Europeans in this new world than by brewing a beer that they might even have made? (Historians have not proven conclusively either way, but I have my suspicions that something similar to this recipe would have been thought up by the brewsters of Plymouth.) I am speaking, of course, of a Pumpkin Pie. Ale, that is. Reddish orange in



Pilgrim's Pumpkin Pie Ale
(5 gallons, grain and extract)

Ingredients:

- 2 to 3 lbs. pumpkin
- 0.5 lb. two-row pale malt
- 0.5 lb. malted wheat
- 0.5 lb. medium crystal malt, 40° Lovibond
- 5 lbs. unhopped amber malt extract (or 4 lbs. unhopped amber dry malt)
- 1 cup light brown sugar
- 1/2 cup unsulphered molasses
- 1 oz. Mt. Hood hop pellets (4% alpha acid), for 57 min.
- 0.5 oz. of pie spices: nutmeg, cinnamon, clove, allspice, cardamom, ginger in cheesecloth bag
- Ale yeast (such as Wyeast 1056, American Ale)
- 1 cup light dry malt for priming

Step by Step:

Cut in half, clean out, and bake one pumpkin at 300° F for one hour or until flesh becomes mushy. Crush two-row and crystal malts and malted wheat. Mash the malt and the pumpkin together in 5 qts. of water at 152° F for 55 minutes, then raise the temperature to 165° F for five minutes. Run off and sparge with 5 qts. of water at 170° F, gathering (hopefully) about 2 gals. of sweet wort.

To the kettle add malt extract (or dry malt), brown sugar, and molasses. Bring to a boil, then add Mt. Hood pellets. Boil 55 minutes. Add pie spices in a bag and boil just long enough to mix them in (two to three minutes). Remove the bag.

Remove the kettle from the heat, chill, and top off to 5.25 gals. in your primary fermenter. Ferment with a clean ale yeast, prime with light dry malt, and bottle condition cool (50° to 55° F) for a month. Serve at cellar temperature to allow the blend of flavors to truly express themselves.

Notes:

Pumpkin: Avoid using canned pumpkin pie filling. It is already spiced, often, and is laden with preservatives and artificial products (although if you can find organic, all-natural, no-preservative, unspiced canned pumpkin, by all means use it). It is important to use a partial mash with this recipe; I can't figure out any other good, efficient way to use the pumpkin and get anything out of it (I'm open to suggestions!).

Malts: All-grain brewers can adapt this recipe to a standard "amber ale" grain bill, but be sure to include a little malted wheat for better head retention. Extract brewers may have trouble using the pumpkin unless they do a partial mash as described above.

Spices: The biggest problem with this brew is the proper ratio of spice to beer. It is very easy to overdo, especially with strong-flavored spices such as ginger and clove. I have arrived at a dose of only 0.5 oz. total, which will not seem like enough as you brew but will be noticeable in the mature beer.

My personal blend is "heavy" on nutmeg and cinnamon and *very* light on ginger and clove, just enough to indicate their presence. I've found that leaving the spices in the fermenting beer tends to become overwhelming, hence the use of a bag or some other device to steep the spices in the boiling wort but then remove them.

The commercial "Pumpkin Pie Spice" mixtures available on the grocery store shelf seem to me a little too gingery/clovey, so I make my own blend. Also, I have better luck with larger pieces: crushed or shaved whole cinnamon stick, allspice berries and nutmegs, whole cloves, and small pieces of fresh ginger. rather than any finely ground forms.

color, creamy tan head, sweet and spicy, rich and unique. Like a New England fall afternoon. Like Thanksgiving 1621.

Reader Recipes

Chocolate Porter #47 (all-grain)

"I'm a big porter and stout fan, and I think that I finally found the perfect porter recipe. It has a real full chocolate flavor and is quite creamy smooth."

Jeff Atkins
Springfield, Ill.

Ingredients:

- 9 lbs. American two-row (klages) malt
- 12 oz. chocolate malt
- 8 oz. flaked barley
- 1 oz. Cascade hops (for 40 min.)
- 1 oz. German Hallertauer hops (for 20 min.)
- 1 tsp. gypsum
- Wyeast Munich #2305
- 3/4 cup corn sugar for priming

Step by Step:

Bring 11 qts. of water to 135° F with gypsum to balance pH to around 5.7. (I have hard well water to begin with.) Add malts and barley with the temperature around 128° F. Hold for a 30-minute protein rest. Bump temperature to 152° F and hold for one hour. Bump again to 168° F for five minutes. Sparge with 4 qts. of 180° F water. Boil wort 35 minutes and add Cascades. Boil 20 more minutes and add Hallertauers. Boil 20 more minutes. Strain out hops and sparge them with 1 pt. boiled water. Pitch yeast at 62° F. Ferment in primary for seven days and in secondary for six days. Bottle with corn sugar and 1.5 cups water (boiled for 5 minutes).

OG = 1.054
FG = 1.006

Shawn's Real IPA (extract)

"This recipe makes a well-hopped, malty, amber India pale ale in the British style. The specialty grains really gave it a nice head retention."

Shawn Andrews
Highland, N.Y.

Ingredients:

- 4 lbs. light malt syrup (preferably English)
- 4 lbs. amber malt syrup (English)
- 1 lb. crystal malt, 40° Lovibond
- 0.5 lb. toasted Klages two-row malt (toast in oven on a cookie sheet at 350° F for 10 min.)
- 2 oz. Northern Brewer pellet hops (8.8% alpha acid), for 60 min.
- 1 oz. East Kent Goldings plug hops (5% alpha acid), for 5 min.
- 1 oz. Willamette pellet hops (3.2% alpha acid), for steeping
- 2 tsp. gypsum
- 1.5 tsp. Irish moss flakes
- 1 oz. Kent Goldings pellet hops (5% alpha acid) for dry hopping
- 1 smack pack of Wyeast British Ale in a 1/4 gallon starter culture
- 3/4 cup corn sugar for priming

Step by Step:

A bigger brewpot is nice for this one. I use a five-gallon pot. Bring 2 gals. of water to 160° F and add cracked crystal and toasted Klages in a grain bag. Steep in water for 30 minutes. Remove grains and sparge them with 1 gal. of 165° F water. Add gypsum and bring to a boil. Add malts, being careful not to let it boil over. Add Northern Brewer hops, being especially careful to avoid boilover, and stir.

After 45 minutes add Irish moss. After 10 more minutes add East Kent Goldings hops. Boil for five more minutes. Just before you pull the kettle off the stove, throw in the Willamette hops and let steep with the lid on. Force cool and transfer to a 6.5-gal. carboy. Be careful not to carry too much trub (the solid matter) into the fermenter.

Pitch the yeast. Rack into secondary and dry hop with Kent Goldings after four days. Bottle after 10 days, using corn sugar to prime. Store in a cool, dry place for six weeks. Chill to 55° F, and enjoy.

OG = 1.053
FG = 1.014 ■

The History of Cider 101 Professor Marmota Monax

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

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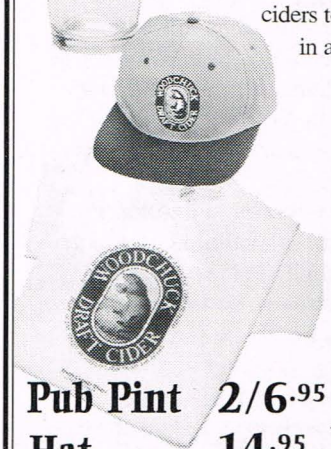

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Weighty Issues

Mr. Wizard

Please help me, Oh great and powerful wizard of buzz!

As a neophyte homebrewer, I have studied several texts, including the exalted tomes from Mr. Papazian, but I have not obtained a clear understanding of "alcohol by weight" versus "alcohol by volume."

Please enlighten me about the realistic (or practical) differences between these two measurements. Are these two measurements used for specific purposes that one or the other wouldn't be?

Thank you, my master of mash!

Patrick Newman
Spring, Texas

The difference between alcohol by weight and alcohol by volume is fairly straightforward. Suppose you have a really big mug containing 100 fluid ounces of beer that is 5 percent alcohol by volume. If you could remove all the alcohol from this sample, you would have 5 percent of 100 ounces or five ounces of pure alcohol (ethanol).

If, on the other hand, you knew this sample contained 3.95 percent alcohol by weight, the answer would be a bit different. To begin with you would need to know how much the 100 fluid ounces of beer weighed. For the sake of this example, assume the sample weighs 6.5 pounds. Since 3.95 percent of 6.5 pounds is 0.257 pounds or 4.1 ounces (weight ounces not fluid), the sample contains 4.1 ounces of alcohol by weight. These 4.1 ounces (weight) of alcohol occupy five ounces of volume. This means that 5 percent alcohol by volume and 3.95 percent alcohol by weight are the same thing.

This example is much easier if the metric system is used. Assume for the moment that you have one liter (1,000 ml) mug of beer that contains 5 percent alcohol by volume or 3.95 percent by weight. Using the alcohol by volume figure, it is clear that 50 ml of pure alcohol is in the beer.

Calculating the weight of alcohol becomes simple with the metric system. One liter of beer weighs the same as its specific gravity because specific gravity is expressed in the form kg/liter. If its specific gravity is 1.008, then it weighs 1.008 kg or 1,008 grams. That means there are 39.8 grams of alcohol in the beer. Since the density of alcohol is 790 grams/liter, it can be determined that 39.8 grams of alcohol occupies 50 ml. Again, the same result is obtained as the previous example using pounds and gallons.

To simplify this mess, if you know alcohol by volume, you can approximately convert it to alcohol by weight by simply multiplying alcohol by volume by 0.79. Similarly, if you know alcohol by weight and want to approximate alcohol by volume, just divide the former by 0.79.

Hopefully, this answers your question about the difference between the two measures. The next question is: Why all of this confusion? In the US all alcohol except beer is sold by volume. This means if you want to equate the number of beers consumed to the number of mixed drinks, you first must convert alcohol by weight to alcohol by volume. I'm not sure why this practice began, but some argue that it makes the alcohol of beer appear lower than that of other beverages. This supposedly discourages consumers from buying beer based on its high alcohol content, since it appears lower than other alcoholic beverages. This seems just absurd enough to believe.

In other countries beer is sold by volume. This is why American tourists frequently insist beer is stronger in other countries. For example, "Man, the Moosehead in Canada is real strong stuff. It's 5 percent alcohol up there! Try some of my stash I brought across the border, but be careful 'cause it'll mess you up a lot sooner than 'regular' Moosehead." I have heard this ridiculous conversation more times than I care to remember. It's like saying "Man, those Brits are really tiny; their average weight is 73 kilograms, unlike us manly Americans with an average weight of 160 pounds."

Mr. Wizard

I would like to get started brewing my own beer and was wondering what reference materials I should obtain to get me started.

Eric B. Richardson
Los Angeles

The answer to this question has more to do with your personality than anything else. If you are part of the Nike generation, the "Just Do It" crowd, then a trip to your local homebrew store with a note pad could suffice. Honestly, if you start out with a beer kit, you can glean enough information from that can and a good long chat with an experienced homebrewer to get you going.

If, however, you are the type of person who likes to read and think about things first, then reference materials are what you need. There are several very good homebrewing

books on the market with lots of information. These books will provide almost all of the information sought by most homebrewers.

Personally, I think Dave Miller's original *The Complete Handbook of Home Brewing*, copyrighted in 1988, is an excellent book for beginners and experienced homebrewers alike. Other classics in the homebrew literature include *The New Complete Joy of Homebrewing* by Charlie Papazian, *Brewing Quality Beers* by Byron Burch, and *Brewing Beers Like Those You Buy* by David Line. Many homebrew supply stores have a very good selection of brewing books. If you can't find these books locally, the American Homebrew Association in Boulder, Colo., sells homebrewing texts through its mail-order catalog.

The next level of reference materials is geared toward the professional brewing audience, but the science of brewing contained in its pages is applicable to all levels of brewing. The recently released text by Michael J. Lewis and Tom Young, *Brewing*, is an excellent book written for the college-level student in brewing science.

If your desire for information thirsts for more, try the two-volume *Malting and Brewing Science* (D. Briggs, J. Hough, R. Stevens, T. Young). This is a valuable reference text packed full of malting and brewing science, as the name suggests, and has more than 1,000 references to published research.

If you really want deep stuff, try the three-volume series of monographs *Brewing Science* edited by Pollock and Poole. Since the series costs more than $500, try to find it at a university library if you really want to thumb through its pages.

At this point the level of material has progressed far from the realm of starter material. Take it from me, you don't need to read any of the books geared toward professional brewers to sit back and enjoy quality beers brewed at home. But if your interest in homebrewing goes beyond the pursuit of a great hobby, then maybe some of the more technical texts will prove interesting and useful.

Mr. Wizard

Two questions about straining the hops from the wort before it goes into the fermenter. Is it necessary to do this if you are using hop pellets or just whole hops, and what are the advantages of each?

Bill Burke
Bayville, N.Y.

This is one of those letters that makes me scratch my head and question the "necessity" of this step in brewing. Commercial brewers always separate hops, be they cone or pellet, before fermentation. This practice is needed for wort cooling using modern plate-and-frame heat exchangers that will become clogged with hop pellets or cones, and the

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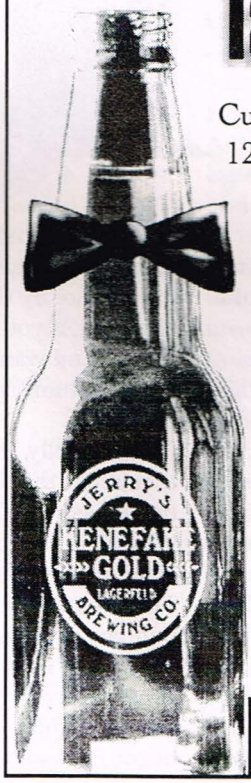

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yeast harvest is free of hop debris as a result of the practice.

But whether hop separation is necessary or not is an entirely different question. My guess is that very good beer could be made by cooling hot wort in the kettle it was boiled in and fermenting in the same vessel without trub or hop separation. This approach is certainly unorthodox and brewers, including myself, get a little nervous when unorthodox techniques are practiced. Today's brewers figure that brewing techniques have developed over the millennia to yield the best beers. If this thought process makes sense, then you should probably conform to the norm and separate your hops.

Your second question is a bit more open ended. Hop pellets have very good storage properties and are easy to separate from wort, but they tend to leave a little more trub behind than cone hops, and some brewers consider their aroma qualities to be inferior to cone hops. Cone hops, on the other hand, are more expensive to store, are more susceptible to oxidation during storage, and are more difficult to separate, but they filter out trub during separation and are considered by many brewers to have superior aroma qualities. Hops, like many things in brewing, are thought of in a variety of ways depending on whom you ask. I recommend that you try out both cones and pellets and come up with your own opinion. ■

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.

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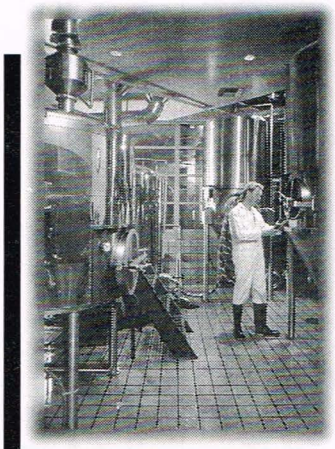

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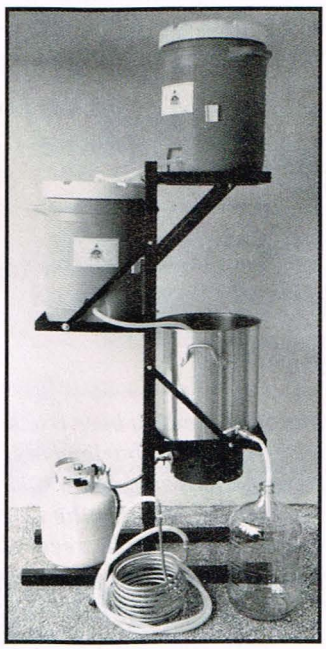

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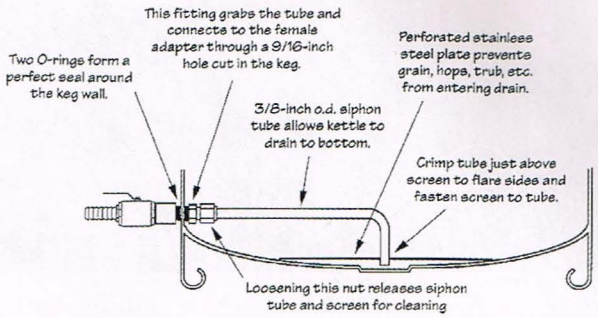

CIRCLE 52 ON READER SERVICE CARD

Experiment With Hops

by Suzanne Berens

In the last few years a wider variety of hops has become available to homebrewers. With so many to choose from, experimenting is not only easy but invaluable in bringing out the unique character of your beer.

Brewer: Steve Dresler
Brewery: Sierra Nevada Brewing Co. in Chico, Calif.
Years of experience: 14
Education: Bachelor's degrees in biology and chemistry from California State University, Chico
House Beers: Pale ale, porter, stout, light and dark wheat (both unfiltered), IPA, brown ale, spring bock, summerfest lager, and Octoberfest lager

Sierra Nevada Brewing Co.

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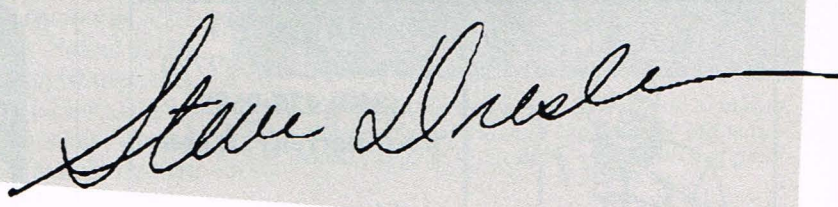
The Tips

- To get the best aroma effect, turn the kettle off, let the boil subside, and add hops for a minimum amount of time.
- Don't be afraid to use pellet hops, especially for hard-to-get varieties.
- Select hops with the appropriate bitterness and aroma qualities for the style you're brewing.
- Experiment. Try Saaz for light-bodied beers, Mount Hood in bock, Strissel Spalt for aroma in wheat beer.

Brewer: Steve Dresler



As far as strategies for adding hops to the boil, what we do at Sierra Nevada is pretty standard — 30 minute additions. We do a 90-minute kettle boil and we add hops at 30-minute intervals. Then we do an aroma hop addition that's usually quite large. The post-boil addition is so that we don't blow out a lot of the volatiles (flavor compounds that are reduced by boiling). We do a fourth addition and then immediately do a kettle strike (remove from the heat). Minimal post-boil contact with the wort gets our aromas up nicely.

We used to strike our kettle through a hop back, which is just basically a big screened container with whole hops in it. That would give us some really nice aromas, but as we expanded and automated, we got into an automatic hop discharge system. By going with the fourth addition and the kettle post-boil, we found we achieved the same aroma quality and were still able to get the hops out just as soon with the automated system.

For homebrewing I would set my kettle off and put my hops in for a very short amount of time.

The Great Leaf Debate

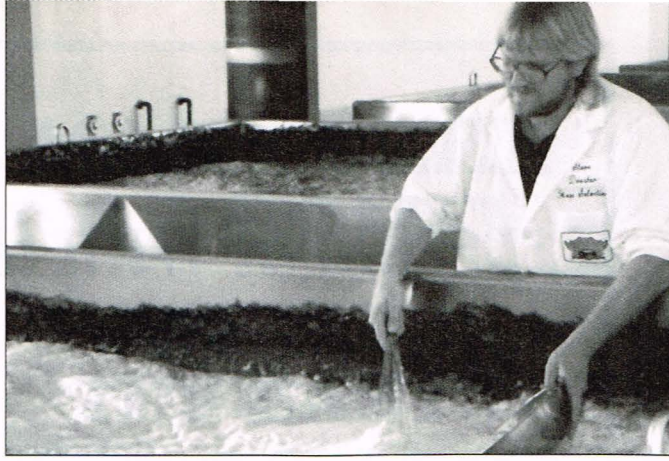
We prefer using leaf hops as opposed to pellet. The aroma is best from the leaf hops. When I used to homebrew, most hops came in pellet form and, unfortunately, leaf hops are still hard to come by, particularly good quality and European hops. These obstacles, coupled with the fact that there's been a great improvement in hop pellets over the last few years, make it hard to tell homebrewers just to use whole-leaf hops because I think that would be a real limitation on their ability to explore.

If, for example, they want to go buy Saaz to make a nice pilsner, they won't find whole-cone Saaz.

70-Barrel Experiments

As far as experimenting goes, we have 13 in-house products now with a great variety of hops. When we do hop selection yearly, if there's a new hop out or a chance to try some different type of European hops, then I'll do a small brew, which for me is 70 barrels. Then I'll feature one of those different types of hops in each experiment and hope to come up with something.

While we can normally make the experimental beer salable in the first run, I usually need to do a little bit of tuning, particularly with hops I've never used before. Either the brew is a little aggressively hopped or you want to get a bit more aroma or something. Usually just by looking at the hop and knowing its numerical bittering value I can formulate a beer and have it pretty palatable on the first go.



Steve Dresler, who homebrewed for four years before turning pro 14 years ago, works in an open fermenter at Sierra Nevada Brewing Co.

Matching Hops to Beer Style

When it comes to choosing varieties of hops, you want to pick a hop to match the type of beer you're going to make. If homebrewers are going to make a very light lager or a light ale, they'd want to go with something that's not heavily bitter and has some nice, light aroma qualities. If they're more into doing dark beers, barleywine or IPAs, those styles would dictate having a very aggressive hop. In that case you start playing with Chinook or some pretty heavy-duty hop.

We use a lot of Cascade in our regular ale, but I have a couple of beers in the pub that feature mainly Kent Goldings. And while it's a really nice hop, if you're going to use it in a big beer, you're going to use a ton.

If you're making something very light with light body and lower alcohol, I'd suggest a nice floral hop. Start playing with Saaz or a French hop we use called Strissel Spalt. I had wanted to buy Saaz, but it was a bad year for that variety so I took the advice of our hop broker and was very happy with the results of Strissel Spalt. It's a really interesting hop, and while it wouldn't go well in a barleywine, for example, because you could never pick it out, it gave our wheat beers a really wonderful aroma.

Among common domestic hops, I like Cascade in ale because it's aromatic with lots of citrus, Willamette in porter because it is milder, Fuggle in porter, and Mount Hood in bock because it has a noble, flowery character but is not too pungent.

Don't be intimidated about trying something new. Play with different hops. A common problem among brewers is not experimenting enough. The beer ends up with too much malt or sugar, without the hops character. Experiment. ■

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Modern Altbier Demands Old Techniques

by Jeff Frane

Some people are just stubborn, I guess. You can offer them brand-new, highly improved technologies, but they still cling to outmoded procedures in spite of everything.

So the world is stuck with British brewers using sugar in the kettle and open fermenters, Belgians putting god knows what in their mash tuns and leaving the wort to sit around and practically rot, and a little clump of German brewers using primitive yeast strains and inappropriate temperatures for fermentation.

When pale, clear, lagered beers became all the rage, beginning in the mid-1800s, these stubborn German brewers missed the boat, and a good thing, too! Most of these recalcitrant Germans live in the northwest of their country, in and around the industrial city of Dusseldorf, where they brew classic altbiers.

"Alt" means "old," a reference to the use of "old" techniques — primarily the continued use of top-fermentation after most other German brewers had adapted to new bottom-fermenting yeasts and cooler fermentation temperatures. Altbiers (and their near-cousins, kölschbiers) are the Teutonic equivalent of British ales — but different.

If Dusseldorf is the center of altbier brewing, the *Altstadt* (Old City) is the core within Dusseldorf. Three of Dusseldorf's four brewpubs are in this region, with the fourth close by. They are "brewpubs" in the sense that the brewery is either in or attached to the tavern, but the sense of scale the terms carry for Americans is inadequate. Several years ago Portland, Ore., brewer Kurt Widmer reported that one of these pubs, Zum Uerige, produced as much beer as the Anchor Brewery in San Francisco — and sold every drop on the premises.

The altbier houses have impressive menus — pork, in various guises, is a big item — but the focus is on drinking beer. Much of the beer is poured from wooden kegs, by gravity flow; no pumps, no tanks of gas. Altbier glasses are short, straight-sided, and stubby, holding about one-quarter liter. When a glass is emptied, a waiter replaces it immediately, marking the total on a chalkboard or noting the score some other way.

An old brewing partner of mine had the good fortune to be sent to Dusseldorf on business. He visited the Altstadt nightly. Not all of his co-workers enjoyed the visits with the same fervor as Pete, and one placed a beer mat over his glass (indicating that he was done) after only the second round. The waiter was outraged. "If you only want two beers," he shouted, "go to the grocery. This place is for drinking!"

OWEN FRANKEN, GERMAN INFORMATION CENTER

In Dusseldorf, altbier houses focus more on drinking than eating and pour much of the beer the old way — from wooden kegs without pumps and tanks of gas.

The Altstadt taverns are unlike American brewpubs in another regard: No attempt is made to offer any variety. One beer is served, although the brewery occasionally will present a *sticke* ("secret") beer, with no great fanfare, for the enjoyment of its regular customers. These beers may be brewed to a higher gravity and even dry hopped as a change of pace. Unfortunately for tourists, there is no way to plan visits around Stickebiers; they are not brewed for holidays, nor are they seasonal specialties like bocks or barleywines might be.

If each brewery offers only altbier, the beers themselves vary from brewery to brewery, much as pale ales do. Some are drier than others, some more bitter. In some cases there may be an apparent hop aroma, although this is unusual.

In general, however, the beers are akin. The color ranges from deep copper to something near brown. Maltiness is always evident, although this is not to say that the beers are sweet. Alt brewers are not afraid to use hops, and the levels of bitterness range from apparent to intense. German brewers tend not to add hops late in the boil, so that hop flavor is usually well married to the malt. Original gravities are in the same ranges as pilsners, about 12° Plato (1.048), with alcohol content about 4.5 to 4.8 percent by volume.

The fruitiness that characterizes British ales is negligible or nonexistent in altbiers. This is largely a result of yeast selection (along with hop choice).

Unlike British ales, altbiers are given a period of cold-conditioning at low temperatures for several weeks after the initial warm fermentation. This process (undoubtedly the great-grandpapa of modern lagering techniques) provides a characteristic mellow smoothness very different from a British ale.

Outside Dusseldorf altbiers can be found in nearby cities, with one brewery, Diebels, mass producing a version. In Munster the brewpub Pinkus Muller brews a very different but most admirable version (fortunately available in bottles here in North America). Unlike the Dusseldorfer alts, Pinkus Alt is quite pale, with a significant portion of wheat in the grist and a crisp, tart character derived from six months of cellaring (along with what Michael Jackson claims is a resident lactic culture). Anticipating the American rage for fruit beers by decades, the pub serves its altbier in a punch made with sweetened fruits.

Altbiers have appeared at any number of American craft breweries, with varying degrees of authenticity and success. Certainly the first was Widmer (now Widmer Brothers) Brewing Co.'s flagship beer, an alt inspired by Kurt Widmer's visits with Zum Uerige's brewer, Herr Schnitzler.

Widmer's earliest attempts, shared with the local homebrew club, were huge malty beers with enough bitterness to stand one's hair on end. The beer (toned down only slightly) developed a cult following in Portland in the mid-1980s but eventually was mainstreamed and almost phased out as Widmer's wheat beer developed a huge popularity. Fortunately for beer geeks, the brewery makes limited supplies of Ur-Alt (a fine beer) for its Gasthaus and a few other locations.

Most of the other American "altbiers" I've encountered (such as Alaskan Amber and St. Stan's) have been disappointing, although I was pleasantly surprised by a contract-brewed version by New Hampshire's Smuttynose Brewery and a "doppelalt" brewed at the Boston Beer Works.

Producing a good altbier at home is a worthy cause but not tremendously difficult. A caveat: Whether a good, homebrewed altbier will do well in competition is another issue; with the paucity of good commercial examples — Dusseldorfer alts don't appear on American grocery shelves — it's difficult for brewers or judges to pin down the style.

Just as in lager brewing, refrigeration of some sort is virtually essential. The rest is simply a matter of care.

I believe the critical component to an altbier is malt. The problem many brewers seem to have, however, is a confusion between "malty" and "sweet." Altbiers, in the main, have a dry finish — a combination of thorough attenuation during fermentation and a discernible hop presence. A good alt, then, should be refreshing yet engaging. The key, as I said, is the use of malt.

One of the best approaches, available to all-grain or extract-mash brewers, is the use of a good Munich malt. Until recently I would have insisted on only a German or Belgian Munich malt. But fine malts are now available from domestic maltsters such as Gambrinus and Great Western.

Caramel malts can be used with restraint, and even a tiny amount of black malt (such as German carafa malt) might be appropriate. Some alt brewers reportedly use small additions of wheat malt, presumably to enhance head retention.

I have brewed altbiers from the same recipe using a decoction, a temperature program (step), and a single-infusion mash, all with good results and a good malt profile. Given the high modification of modern malts, decoction mashes are most useful for enhancing color and malt flavor, but a good percentage of Munich malt seems to be a fine substitute. The one clear distinction among the three processes is that the decocted version was darker — probably too dark — and did not need the touch of carafa malt.

Hopping should be done with continental varieties or their new American clones. Dusseldorfer brewers are apparently fond of Spalt, one of the German "noble aroma" hops. Like all the noble aroma varieties, Spalt is fairly low in alpha acids (about 5 percent), the hop compounds responsible for bitterness in beer. To produce an intensely bitter altbier such as Zum Uerige's (45 to 50 International Bitterness Units) must require massive hop additions. Reserving the noble aroma hops (Spalt, Saaz, Hallertauer, Mt. Hood, or Liberty, for example) for late-kettle additions (about 30 minutes before ending the boil), a brewer could do well by bittering with mid- to high-alpha hop varieties such as Northern Brewer or Perle. The hops should always balance well, never overpowering the malt. A big, hoppy nose would be completely out of character for the style.

A number of appropriate yeasts (such as Yeast Lab A06, Wyeast 1338,

Alt and In The Way

(all-grain, 5 gallons)

Ingredients:

- 5.75 lbs. lager malt
- 3 lbs. Munich malt
- 1 lb. Belgian CaraVienne malt
- 1.5 oz. German carafa malt
- 2.5 oz. Northern Brewer hops (8 percent alpha) for 75 min.
- 1 oz. Mt. Hood hops (3.5 percent alpha) for 30 min.
- Wyeast 1007 in 1 qt. starter

Step by Step:

Mash grains at 155° F in 4.5 gals. water (medium hardness) for 90 minutes. Sparge to 6.5 gals. and boil for 15 minutes. Add Northern Brewer and boil 45 more minutes. Add Mt. Hood and boil 30 more minutes, for a total boil of 90 minutes.

Cool wort, aerate thoroughly, and pitch yeast into open fermenter at 65° F. When primary fermentation is complete (four to five days), rack to carboy and continue at 65° F for several days, or until specific gravity is about 1.020. Move carboy to refrigerator and hold at 40° F for three weeks. Keg or bottle condition as available.

OG = 1.052
FG = 1.010

Alt and In The Way

(extract, 5 gallons)

Ingredients:

- 6.6 lbs. Ireks amber malt extract
- 3 lbs. Gambrinus Munich-90 malt, crushed
- 1 lb. DeWolf Cosyns cara-pils malt, crushed
- 1.5 oz. German carafa malt
- 4 oz. Northern Brewer hops (8 percent alpha) after 15 minutes
- 1 oz. Mt. Hood hops (3.5 percent alpha) after 60 minutes
- Wyeast 1007 in a 1 qt. starter

Step by Step:

Steep grains in 1 gal. water at 150° F for 60 minutes, then rinse to kettle with 1 gal. water at about 170° F. Add extract (before turning on the heat!) and adjust level to 2.5 to 3 gals. water. Boil for 15 minutes. Add Northern Brewer and boil 45 more minutes. Add Mt. Hood and boil 30 more minutes, for a total boil of 90 minutes.

Cool wort, aerate thoroughly, and pitch yeast into open fermenter at 65° F. When primary fermentation is complete (four to five days), rack to carboy and continue at 65° F for several days, or until specific gravity is about 1.020. Move carboy to refrigerator and hold at 40° F for three weeks. Keg or bottle condition as available.

OG = 1.050
FG = 1.012

and BrewTek Cl-400) are available to homebrewers. My personal favorite has been Wyeast 1007, which performs very well in open fermentation and is very attenuative (ferments the wort thoroughly).

Although I have seen this yeast described as "highly flocculent" (clumps and sinks well), I have found a day of cold conditioning (at 40° F) was needed to clarify the beer — not a problem, of course, with a beer destined for three weeks at such temperatures. For bottle conditioning it may be necessary to re-pitch some yeast with the priming sugars.

Fermentation temperatures for altbiers are reasonably warm (in the high 70° F range for at least one brewery!) as long as the yeast strain doesn't produce too much fruitiness or any phenolic flavors. For most strains temperatures in the high 60° to low 70° F range should work very well. Lagering for a few weeks in the 40° to low 50° F range will promote the wonderful smoothness of a good altbier. ■

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HEAD GAMES

A nitrogen injection can put a little Dublin in your brew.

by Sal Emma

It's a thing of beauty. It rises on a pillar of a million tiny bubbles, forming a thick disk of creamy smoothness that makes your mouth water just looking at it.

No, it's not a scooter pie in a hot tub. Rather, a glass of Guinness stout, with that perfect, creamy white head floating at the top of the jar. The best Guinness is pulled from the tap at your favorite pub or — through the magic of modern technology — poured from a tall "draft can" at home.

There's magic in that head. Plus a little luck and one key component: nitrogen. It's the result of years of research and refinement following a simple serendipitous discovery in old Dublin.

Tony Carey, Guinness' director of technical development in Dublin, has spent the past 32 years studying beer foam and improving it in the Guinness we drink. "Innovation often comes at the interface between production and consumption. Such is the case with the trademark creamy head on a glass of Guinness," says Carey.

"In the 1950s Guinness was still cask-conditioned and shipped to the pubs in a state of late fermentation. The beer was very lively in the barrel and could only be pulled by hand. Even using a beer engine, you ended up with mountains of foam in the glass," he says.

One enterprising publican came up with his own scheme for getting the foam under control. "He vented the barrel during the cellar condition to prevent excess carbonation. Then, instead of pulling it by hand, he built a compressed-air system to push the beer up to the tap-room," Carey explains.

What the publican quickly discovered was that his Guinness was better than that of the pubs across the street. The head was creamier and longer lasting. His Guinness developed a following, and

within 10 years nearly every pub in Dublin was using the air-pressure dispense system and reaping the benefits of the amazing head.

Meanwhile, scientists at Guinness were working tirelessly to unlock the secrets of air's effect on beer. They eventually solved the mystery and uncovered nitrogen as the key.

Atmospheric air is roughly 78 percent nitrogen. Since we need oxygen (O_2) to live, our natural tendency is to think of air as mostly O_2, but in fact it is only about 21 percent of the total.

Beer foam is a blend of gas and liquid beer. For reasons we will leave to BYO's Mr. Wizard to explain, nitrogen bubbles are smaller than carbon dioxide bubbles. When you stack millions of nitrogen beer bubbles atop one another, you end up with foam that contains more liquid beer and less gas than a traditional CO_2 based head, hence a denser, creamier head.

Oxidation is the reason Guinness chemists and engineers went about perfecting the nitrogen-based dispense system they use today. It's a blend of nitrogen and carbon dioxide — no oxygen, so no risk of oxidation. The research also led to the development of the in-can widget system. Carey's name is among the patentees.

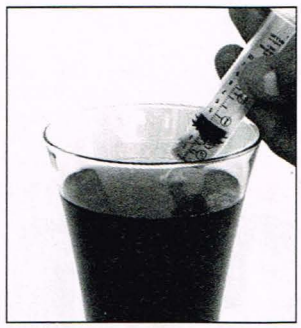
The Foam Thickens

As a homebrewer you might be thinking, "How can I take advantage of this nitrogen phenomenon in my own beer?" Good question.

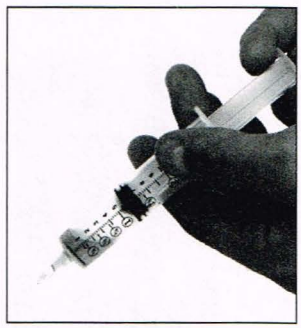
You can use nitrogen in your home brewery to dress your beers with the classic Dublin head.

If you are imagining pipes, tubes, hoses, and regulators, you are partially correct. If you keg routinely you can use nitrogen in your set-up. It just requires storage and regulation equipment separate from that used for CO_2.

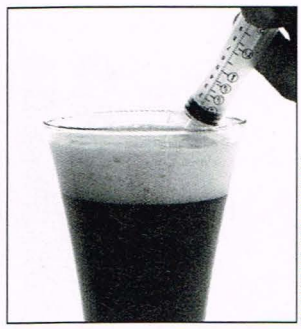
Cliff Tanner, proprietor of Braukunst, a homebrew kegging and dispensing supplier in Carlton, Minn., explains: "High-quality nitrogen is available at welding supply houses. You will need a dedicated regulator for the N_2, because a CO_2 regulator won't work with nitrogen."



1 **Leave an inch or two of headroom in the glass. Suck up some beer.**



2 **Lift the syringe out of the glass and draw in an equal amount of air.**



3 **Keeping the syringe above the beer's surface, shoot everything back in.**

CHRISTINE KELL PHOTOS

Blending nitrogen and CO_2, the way Guinness does, is not worth the trouble, Tanner says. "Mixed gas is more expensive and difficult to control for carbonation. The preferred method is to 'carbonate' the beer with nitrogen — obviously a misnomer here — and dispense as usual with low-pressure CO_2."

You can find nitrogen regulators where you get the gas cylinder.

By far the simplest, cheapest, and possibly most elegant way to get nitrogen in your beer and set a creamy head was inspired, again, by Guinness.

Before the "widget" can, Pub Draught Guinness, was released to the public, Guinness developed an at-home version of the old air-based nitrogen charging system, Guinness Bottle Draft.

Guinness Bottle Draft, in a nutshell, was regular Guinness, only carbonated at a lower-than-normal volume. You had to drink it from a glass to reap the benefits of the system, which featured a small, disposable plastic "initiator" to set a nitrogen-based, creamy head on the beer in the glass.

Each six-pack came with a disposable initiator. The device was a small pump, like a medical syringe without a needle. The beer poured from the bottle with almost no head. The consumer was directed to use the initiator to suck up a little beer, then shoot it back into the glass at high velocity. This brought in some nitrogen-rich room air and seeded a bed of tiny nitrogen bubbles, creating an instant, creamy, Dublin-style head.

Upon discovering the concept, BYO researchers immediately tried to duplicate the technique. In other words, one night either too much beer or too much curiosity encouraged me to zap a glass of homebrew with a child's medicine syringe.

In many homes with small children, the plastic baby-medicine syringe is a pretty ubiquitous item. A syringe, remember, is not a needle. It's the thing to which you attach a needle. In the case of the baby-medicine syringe, it is not designed to take a needle but rather to ensure precision when dispensing oral medication. It looks like a large needle syringe, but it has just a small nipple on the end.

Two characteristics make the gadget work as a Dublin-beer-head initiator: The plunger allows liquid to be expelled at high velocity, and the small outflow port allows for efficient aeration of the beer in the glass.

These syringes are sold in most drug stores. Remember, the kind you need has the plunger. Drug stores also sell the rubber-bulb type of medicine dispensers. These are just enlarged eyedroppers and not suitable for beer.

Dosing Your Beer

The technique is exceedingly simple. Pour your homebrew into a glass, leaving an inch or two of headroom. Use the syringe to suck up some beer. Lift the syringe out of the beer and draw the plunger up a little more, until you have drawn an equal amount of air over the beer inside the syringe.

You want a 50-50 beer-to-air ratio, but remember this is not rocket science.

Now, keeping the syringe above the surface of the beer, shoot it all back into the glass in one quick motion. Sit back and watch the bubble show. You will see that all-familiar dance, waves of bubbles rising from the bottom of the glass, forming a creamy, dense, nitrogen-seeded head. It's a sight. One of humanity's great stress reducers after a hard day at the office.

The lasting power of the air-seeded head you create with the syringe method will depend on your recipe and brewing technique. Many factors contribute to head retention. If your beer is not holding a head on its own, the seeded head will also be short lived.

And what about the dreaded "O" word? You might think that oxidation is a threat when you are deliberately aerating your beer. Don't worry about it; oxidation rarely lives up to its press clippings. Besides, oxidation is a problem of aging and storage, not of beer that is about to be consumed.

Mind the Fizz

Through trial and error you will learn how much beer to draw into the syringe. It depends on the beer's starting carbonation level. If you carbonate at a low level, say under two volumes, you will be able to seed a head with two to four milliliters of beer in the syringe. However, if your carbonation is high, 2.5 to three volumes, you will need to use some restraint with the syringe, as one Anheuser-Busch public-relations flak learned the hard way.

Guinness makes Budweiser under contract for Anheuser-Busch in Europe. When the deal was sealed, Guinness and Anheuser-Busch decided to hold a press conference in Ireland, during which the joint venture was to be toasted with glasses of Guinness and Bud. A variety of dignitaries, including ambassadors and Guinness and Anheuser-Busch executives, were on hand for the photo opportunity.

A glass of Bottle Draft Guinness and one of Bud were poured. But before the cameras started clicking, a Guinness media-relations representative stepped in with his plastic initiator. He quickly zapped the stout, setting a perfect creamy head for the photographers.

Of course, in the few moments it took to complete the process, the head on the glass of Bud had fallen away to nothing. That's when the light bulb blinked in the head of an enterprising Bud public relations man. He stepped forward, grabbed the initiator from his Irish counterpart and zapped the Bud. It erupted like a volcano from the glass, soaking a nearby ambassador with St. Louis' best!

If your beer is fizzy enough, take it easy with the syringe. And have fun.

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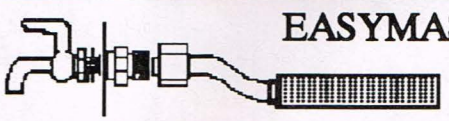

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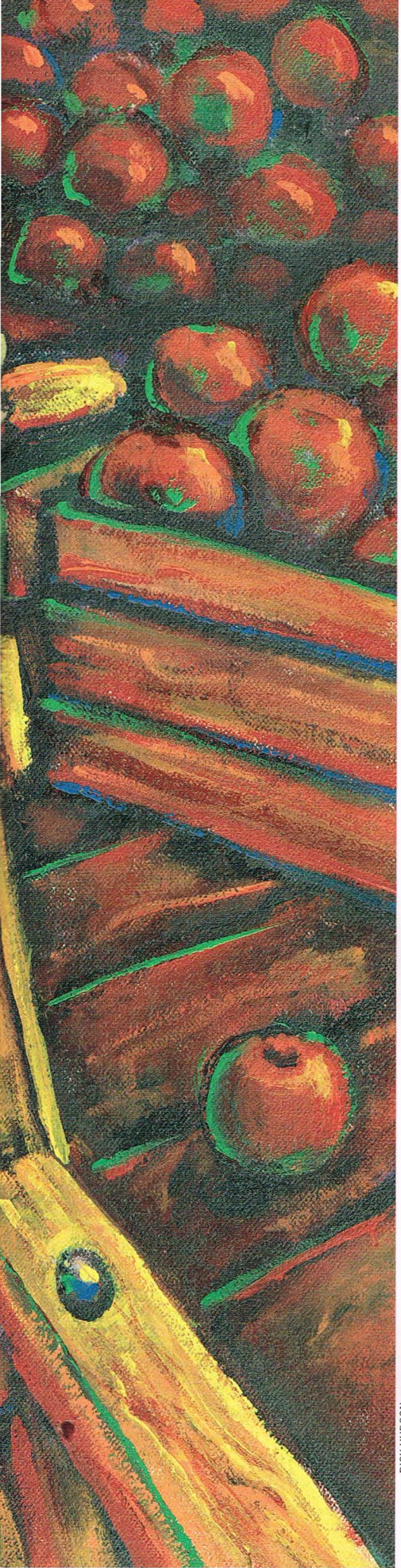


RICK HUDSON

MAKE YOUR OWN CIDER

by Scott Russell

Cider. The word has mythological overtones, especially in rural areas where it is or was made. But just what is it? What differentiates it from mere "apple juice"? After all, technically, unfermented or "sweet" cider is only fresh-pressed apple juice.

The word "cider" comes to English, like so many food and beverage words, from medieval French. "Sidre" came from Latin, which came from Greek, which apparently came from the Hebrew "chekar," meaning "strong drink." So perhaps the English term cider should only apply to fermented or "hard" cider.

Today, outside the United States "cider" generally means hard cider. But even there we find a number of distinct style variations, depending on which country we find ourselves inhabiting. In my experience, and I'm sure I'm making a generalization to which someone will object, I have found British cider to be strong and still, basically an apple wine of 8 percent to 10 percent alcohol by volume, with a very strong apple aroma and fruity flavor.

French "cidre," on the other hand, is lighter, sometimes sweeter and sometimes quite dry but almost always effervescent. Méthode champenoise bottling procedures (fermenting in the bottle) are used, especially in Normandy and Brittany, France's most renowned cider-producing regions (and arguably the best in all Europe). Norman hard cider is distilled and aged to produce the wonderful apple brandy known as Calvados.

English cider apples are in all likelihood descended from Norman apples brought over by William the Conqueror in the 1060s. Those same apples, and those of Brittany as well, were also brought to the New World by French explorers and settlers in Quebec. Indeed the province of Quebec is another major producer of hard cider today, most of it similar to the French style, light and sparkling but varying in dryness from sweet and fruity to champagne-like "sec."

I limit myself to these three influences mainly because that's where my cider-making picks up. The cider I make is marked by both the English and French traditions. New England farmers tended to make English-style cider (and still do, in the main), fortifying it with various sugars, honey, maple, and the like, letting it ferment on its own naturally (with the possible addition of raisins to inoculate the juice or "must" with a suitable "wild" yeast), and leaving it to age in casks. If it is packaged, it is usually still or only slightly carbonated. In northern New England, where we are closer to Quebec, there is some cross-border influence, and many cider makers in Vermont, Maine, and New Hampshire leave their cider sweeter, fruitier, and lighter, and bottle condition it with added priming sugar.

WASHINGTON APPLE COMMISSION

Not all apples are created equal. Blend tart, bland, and sweet apples to find the proper balance for your cider.

Cider is one of the reasons I became a homebrewer in the first place. My first foray into homebrewing involved gallon jugs of orchard-fresh sweet cider that I hid in the back of my closet and allowed to turn a little when I was a teenager. But it was my brother Kirk, who began making cider as part of his job as a historian/interpreter at a famous New England farm museum, who really got me going. Tasting some of Kirk's homemade cider made me long for Normandy (where I had lived for a year) but also reminded me that it was possible to make it myself. I hadn't yet started making beer either, but Kirk remedied that by buying me a homebrew kit the following Christmas, and the rest is history.

Decisions, Decisions

There are two questions that any would-be cider maker needs to consider, above and beyond all else: How fresh does the cider that you will ferment need to be? And how hard do you want to make it?

The first question simply underscores the choice that you have between buying pressed cider from an orchard or pressing it yourself. It's convenient, of course, to go to the orchard and buy jugs of fresh sweet cider. There are three considerations, however: price (in peak season, a gallon of fresh cider can fetch as much as $5); preservatives (normally, orchard-fresh cider is untreated, but one must

Mixing Apples with Apples

There are four basic types of cider apples: sweet, acidic, aromatic, and astringent. Sweet apples include Baldwin, Cortland, Delicious, and Rome Beauty. Acidic apples (medium to high acidity) are Northern Spy, Winesap, Greening, and Pippin, among others. MacIntosh and Russet are the best-known aromatic apples, and astringent apples are basically wild and crabapples, without true varietal names.

If all are available, a good blend would typically include about 50 percent sweet, 35 percent acidic, 10 percent aromatic, and 5 percent astringent. Rarely does a cider from a single variety have all the desired characteristics, so blending is advisable.

Adapted from The Art of Cidermaking, *Brewers Publications*

be careful); and suitability for fermentation. This last consideration is the most crucial, and I will come back to it. The other alternative, obviously, is to grind and press your own. This too can be prohibitively expensive.

To press your own you can buy your own grinder and press (which can easily run $450 or more); get friendly with someone who has one (this may cost you in bartered bottles of finished product, or labor); or if you're somewhat masochistic, you can wash, cut, and grind your apples with a food processor and/or juicer (if you've got loads of time and patience).

Some orchards will "custom press" for you — you bring or buy the apples and then use their press on site, usually for a small fee.

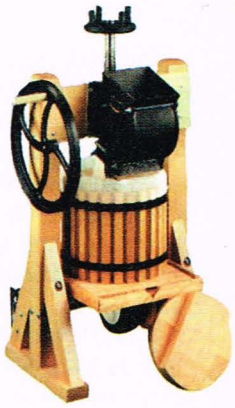
If you don't want to go to the trouble of pressing your own apples, you can buy packaged cider concentrate. Two or three of the malting companies that produce canned beer kits also package cider concentrate kits.

How Hard is Hard?

How hard you want your cider may depend on which style you prefer. To my mind, still ciders can stand to be stronger than effervescent ciders, but that is not a rule. If you want a lighter, sweeter cider, use nothing but apples. If you want something stronger, you will need to add fermentables. Cane and corn sugar are cheap, but honey and maple syrup give more body and more flavor. Add sugars to adjust your starting gravity as you would for beer. Remember that the fermentables in apple juice, maple syrup, and honey are more complex than those in cane or corn sugar, so plan your fermentation schedule accordingly.

What's In an Apple?

Now back to the question of suitability for fermentation. Not all apples are created equal, and therefore not all apples will make equally good cider. Some are too sweet, some too tart, some too bland. Wise cider makers will blend a carefully selected variety of apples to achieve the flavor they like. The bland apples often serve as a base. They provide plenty of juice and plenty of fermentables but will not have a pronounced effect on the flavor. Tart apples are necessary to balance the sweetness of other sugars, if used, and sweet apples can compensate for the acidity of the base apple. See "Mixing Apples with Apples" (page 28) for ideas on varieties and blends.



Recipes

As each cider maker will have access to different varieties and quantities of apples, depending on the region in which he or she lives, these are general outlines for styles and strengths rather than specific recipes.

Cidre Normande

This cider is light, sweet, fruity, and effervescent, approximately 3.5 percent alcohol by volume.

Ingredients:

- 5 gals. fresh-pressed sweet cider, blend emphasis on sweeter and more aromatic apples, less on acidic apples.
- 2 cups honey
- 1/2 tsp. acid blend
- 1/2 tsp. yeast nutrient
- 5 grams champagne yeast
- 2/3 cup corn sugar

Step by Step:

Add honey, acid, and nutrient to the cider and ferment with the yeast. Rack after three weeks. Bottle in champagne bottles at approximately 12 weeks, priming with corn sugar. Bottle condition for six weeks.

New England Hard Cider

This cider is drier, slightly stronger, bubbly but not champagne-like, approximately 4.5 percent alcohol by volume.

Ingredients:

- 5 gals. fresh-pressed sweet cider, emphasis in the blend on acidic (as much as 40 percent) and astringent apples (8 to 10 percent)
- 4 cups cane sugar
- 1/2 tsp. acid blend
- 1/2 tsp. yeast nutrient
- 7 grams wine yeast
- 1/3 cup corn sugar

Step by Step:

Add sugar, acid, and nutrient to cider and ferment with yeast. Rack after five weeks. Bottle in 16-oz. beer bottles at about 20 weeks, priming with corn sugar. Bottle condition for 10 to 12 weeks.

English Hard Cider

This cider is strong, still, and balanced, approximately 7 percent alcohol by volume.

Ingredients:

- 5 gals. fresh-pressed sweet cider, emphasis on a balance, as given in "Mixing Apples and Apples," page 28.
- 4 cups cane sugar
- 2 cups brown sugar
- 2 cups honey
- 1/2 tsp. yeast nutrient
- 1/2 tsp. acid blend
- 7 grams wine yeast

Step by Step:

Add sugars, honey, nutrient, and acid to cider and ferment with yeast. Rack after four weeks, bottle in corked wine bottles at about 20 weeks. Age in wine-cellar conditions for six months.

Adjunct sugars also depend on your goal. If you want sweeter and more full-bodied cider, use honey and don't let it ferment all the way out. If you want dry cider, use cane or corn sugar. You can even make a "dark" cider by adding brown sugar or molasses. I often use maple syrup for a real New England touch.

Now, if you talk to New England cider makers, you will hear almost all of them say that there's enough of the right kind of wild yeast in the apples to get fermentation going. And they're probably right. After all, we didn't pitch any yeast in those plastic jugs in the closet, did we? However, there are also acetic acid-producing bacteria in there, so even the best sweet cider will continue beyond hard to vinegar if left alone. For this reason I always pitch a wine yeast.

You can add sulfite to the must to reduce bacteria and wild yeast as many winemakers do, but some people have allergic reactions to sulfites, so you might want to avoid using them. Sulfites do, however, represent a reasonable way to presterilize your cider if you want to be extra certain to ferment cleanly. One or two Campden (potassium meta-bisulphite) tablets per gallon will eliminate any possibility of bacteria or wild yeast.

Be sure to aerate the must, letting it sit for a good 24 hours before pitching the yeast. A champagne yeast is

Cider Variations

As with beer, different ingredients and approaches to cider making will give different results. Try some of these variations:

- Use maple syrup instead of honey or sugar for a smoky sweetness and lingering aftertaste.
- Add "mulling spices" such as cinnamon, nutmeg, and cloves for a holiday cider treat.
- Blend apples with other fruit juices: pear, peach, rhubarb, cherry, or strawberry. Test small quantities to make sure you like the combination before you commit your apples.
- Apple beer? Sure, why not? See the Recipe Exchange column in the September '96 BYO for one possibility, but don't be afraid to simply blend part cider, part beer wort.
- Many home cider makers have techniques for "fortifying" their cider, and although it is illegal to distill, if one were going to make a harder cider, freezing and removing the ice would be my method of choice (sort of like making an eisbock), but since it's illegal to do that...

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the best choice, especially if you are going to put it up sparkling.

As in winemaking, it is a good idea to use a bit of acid to increase the tartness of the juice. One-quarter to one-half teaspoon of citric acid or winemaker's acid blend per five gallons will give a pleasant sourness without overdoing it. If adding any honey or maple syrup, you might also find it helpful to add some sort of yeast nutrient or "energizer" to improve the efficiency of the fermentation.

The How-To

Now that we've covered ingredients, the process of making cider is relatively easy.

First, we have to get the juice. The apples must be ground to a pulp and then slowly and gently pressed to squeeze all the liquid out of the fibrous flesh. In a press designed for apples, this happens in a wooden tub lined with cheesecloth or some such straining material, which retains all the solid ("pomace") while allowing the liquid through. The press itself is a screw with a plate on the bottom. The sweet cider is collected in a container, adjunct sugars added if desired, and voilà, we have "must," ready for fermentation.

As with fermenting beer, cider is best kept airtight and sanitary. Old-time cider makers may have fermented in cheesecloth-covered barrels in the cellar, topping off the working cider daily with fresh stuff. Knowing what I know about yeast and bacteria, I strongly recommend closed fermentation. I use the same equipment for cider that I use for beer: plastic buckets, glass carboys, and airlocks. Generally speaking I will let my cider work for three to four months (this translates to pressing in September or October, bottling in January). While cider usually does improve with more aging, it is harder to get sparkling cider (which I prefer) if the yeast has mostly dropped out. So I sacrifice a little mellowness for a better effervescence.

My four-month-old cider is primed with corn sugar (seven-eighths of a cup for five gallons) and bottled in champagne bottles, usually corked rather than capped. The reusable plastic champagne corks and wires work great. The bottled cider is put away to age and condition for at least six months. Harder and drier ciders sit for a year or more if I can stand waiting, while sweet and fruity ciders just seem a perfect fit for warm summer evenings. And nothing seems to make the work of grinding and pressing a new year's harvest go easier than a mug of sparkling hard cider.

There are two very good books on the market that I recommend to anyone interested in learning more about the history and lore of cider as well as the process and technical aspects: *Sweet and Hard Cider*, Garden Way Publishing, and *The Art of Cidermaking*, Brewers Publications.

If you are interested in purchasing a cider press or apple grinder (or other components) I suggest you contact Happy Valley Ranch, Paola, Kan., at (913) 849-3103.

Scott Russell manages the Seven Barrel Brewery Homebrew Shop in West Lebanon, N.H. He writes BYO's Recipe Exchange column.

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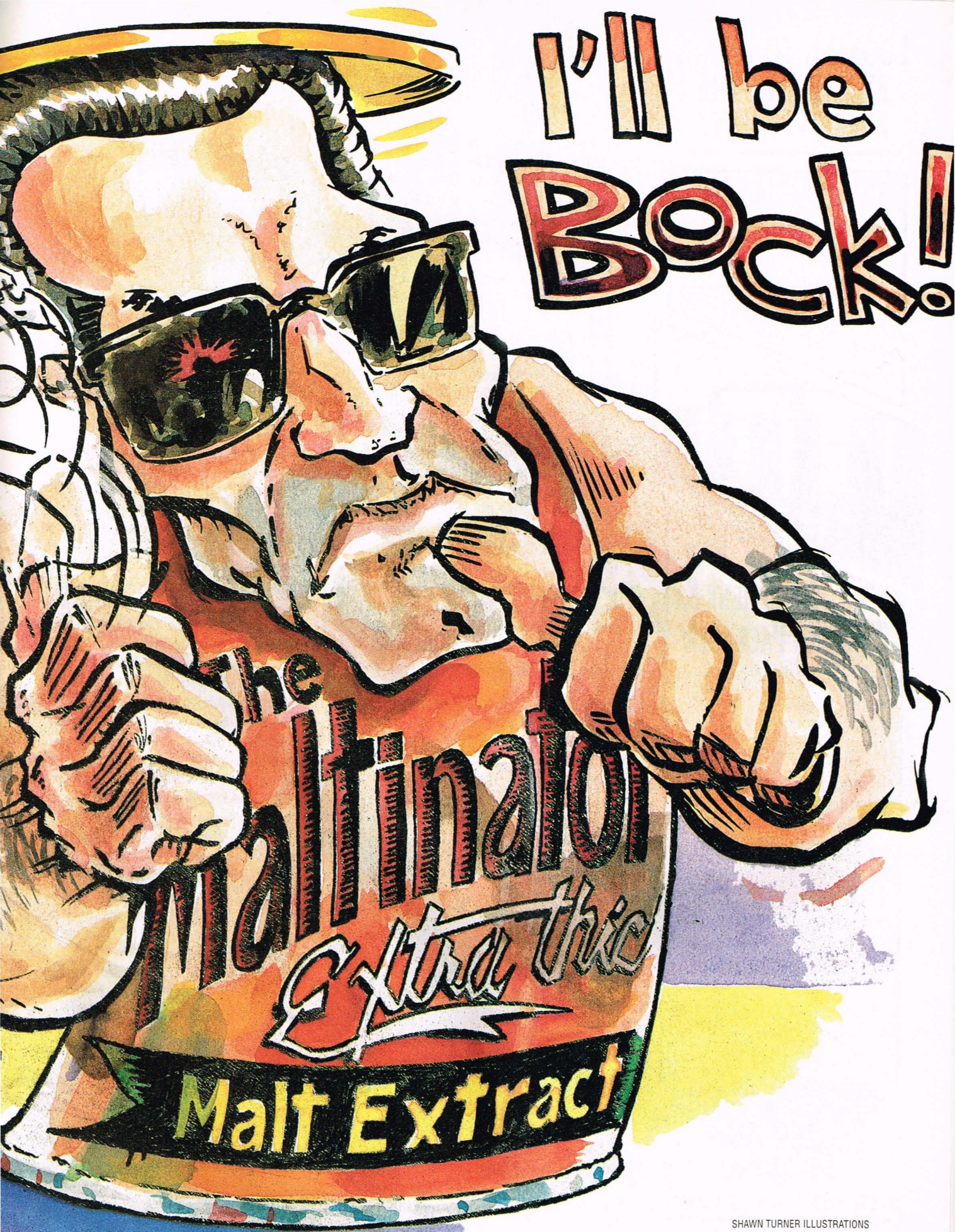
PUMP UP your extract brewing skills

by Sam Wammack

There's one thing for sure about malt extract — it's great stuff! History doesn't record the name of the 19th century brewmaster who first had the idea of concentrating and storing unfermented beer wort so the beer could be brewed at a later time, but he had a good idea. By changing malted barley into malt extract, a brewery could avoid problems with insects and mold and still store grain long past the harvest season. Also, concentrated malt extract was easier to ship to breweries located far from barley-growing areas.

Malt extract can be described as dehydrated unfermented beer. To make extract a manufacturer starts out just as a brewery making beer would, with an all-grain mash. The combination of grains used in the mash as well and the mashing temperature determine the final color and flavor of the malt extract.



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From the mash the wort is placed in the evaporator. The evaporator maintains a high temperature while a vacuum takes the water out of the wort. For dry malt extract all the water is removed. For malt-extract syrup most of the water is removed. The product is then cooled and packaged, and if the malt extract is to be hopped, isomerized hop extract is added before packaging.

Some large American breweries, especially Pabst, got through Prohibition by switching to the manufacture of malt extract. There was a thriving market for homebrew supplies when beer was illegal, and Pabst's Blue Ribbon Malt Extract, sold in food markets as a "diet supplement," helped many thirsty Americans make it through to the repeal of Prohibition in 1933. Malt extract really is used in hundreds of food products besides beer. Many homebrewers' families have discovered that a tablespoon of unhopped dry malt extract, blended into a glass of ice cream and milk, makes a great "malt" out of a milk-shake!

Malt Economics

In the early days economy was one of the main reasons for brewing beer at home. Before the 1980s most homebrew supply advertisements took the "10 cents a bottle!" approach. Since economy was the motivation, many malt extracts contained sugar as well as malt. Also, most early homebrew recipes called for adding more sugar when brewing the beer. Sugar costs a lot less than malt extract, and it was an easy way for a malt extract manufacturer to economize on his product.

Even today, some homebrewing products are manufactured for foreign markets where economy is the main reason for brewing. Some of the extracts are of excellent quality, but some care should be exercised when buying a malt extract. Products from well-known manufacturers are usually good, and some of the extracts are starting to list the contents or put the statement "100 percent Malt Extract" on the label. If a malt extract label doesn't show the contents, and especially if it has a "no boil and add sugar" recipe on it, you may be buying a lot of sugar instead of malt extract.

Now, it is often impossible to tell if a great homebrew was made from grain or extract.

Kits and Cans

Most malt extracts on the market are of very good quality. In fact there has been a big improvement in malt extract quality in the last 10 years or so. All-grain beers used to stand out noticeably above extract beers in homebrew competitions. Now, it is often impossible to tell if a great homebrew was made from grain or extract. If good brewing procedures are used with a high-quality malt extract and a good balance is achieved in the recipe, the finished beer will be as good as an all-grain beer.

In most cases it is best to ignore malt label instructions and recipes. The product inside the can may be excellent, but the finished beer will be much better if a good, modern recipe is used that includes a one-hour boil and all-malt brewing.

Designing a beer with malt extract is just as easy as designing a beer with grain. The thing to remember is that any beer style can be made from light, unhopped malt extract, and everything added to that is just coloring and flavoring.

In choosing an extract to brew with, the brewer has total control over how much of his own design he wants to put into the beer. On one end of the scale, a brewer can base the recipe on light unhopped malt extract and add

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all the specialty grains and hops to achieve the desired results. There are thousands of published recipes and guidelines to help a brewer do this. On the other hand a brewer can buy a can of "Green Kiwi New Zealand Stout" and leave the choices of specialty grains and bittering hops up to the malt extract manufacturer.

The mixtures put out by malt extract manufacturers are usually quite good. They have certainly been test-brewed, and the manufacturer felt that the resulting beer was good enough to market. Often, these mixtures are in cans and they are labeled "kits." A "kit" of this kind is just a can of hopped malt extract to which the manufacturer has made some additions of specialty grains and bittering hop extract. These can be good makings for your brew, but the final product depends on the brewer. Don't be afraid to be inventive. Three "Pale Lager" kits, for example, can make the basis for a great IPA (India pale ale). A couple of "Belgian" kits can turn into a fine English Bitter. Tinkering with these things is a lot of fun — but stay away from those malt can recipes!

Then there's the question of what to do with the packet of yeast that comes on top of a malt can. Don't use it in your beer! That yeast is of unknown quality and age, and it may have been stored in a hot warehouse for months. Instead, buy some fresh yeast for the beer and throw the malt-can yeast into the boiling brewpot! Boiling will kill the malt-can yeast, of course, but yeast hulls are one of the best nutrients for activating your good yeast.

Let It Roll

After choosing your recipe and ingredients, brewing is all procedure. The finest brewing ingredients will be spoiled by poor brewing procedure, and mediocre brewing ingredients can produce some pretty good beer if the procedure is good. As in all brewing, the most important thing is good sanitation. Unfermented beer wort, once it is cooled, is a rich broth that will be

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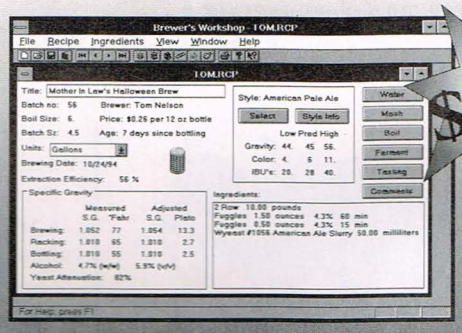

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greatly enjoyed by many wild yeasts, bacteria, and molds if they can get to it. By practicing good sanitation techniques, you can keep the unwanted critters out of the wort and allow your brewing yeast to ferment the wort into good beer.

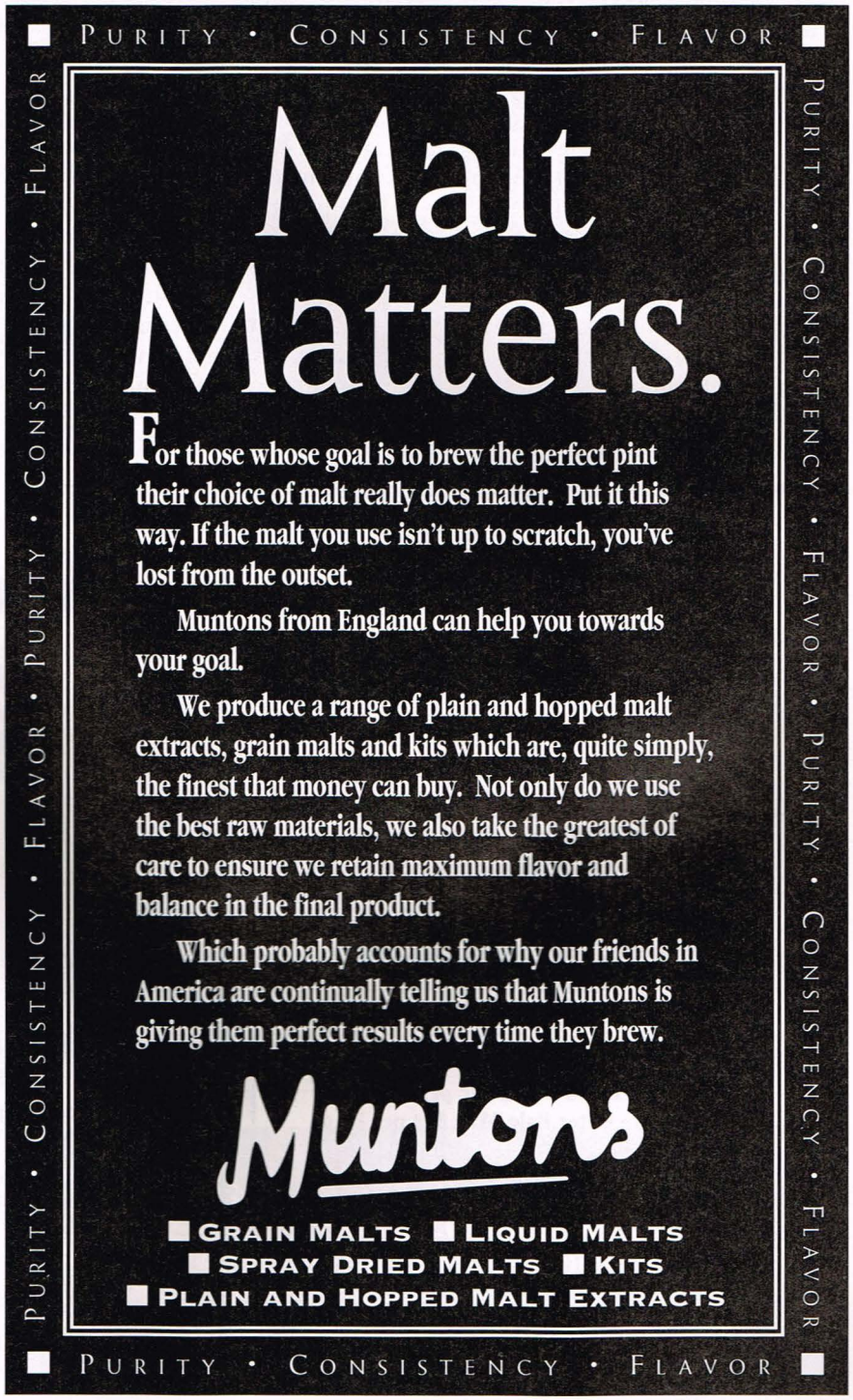
Good brewing needs to include a vigorous rolling boil of at least one hour. There are many published recipes that call for a shorter boil or a partial boil. Manufacturers like to show customers that their products are extremely easy to use, and they may suggest reducing or eliminating the boiling period. There are complex chemical changes in both the extract and the water that take place during the boil, and the quality of the beer will suffer if the boil is skipped or reduced. Also, if you use unhopped extract, the boil is necessary to get the isomerization of the your added hops.

Many homebrewers are unable to boil the whole five-gallon batch because of the size of their brewpot or their stove. They routinely boil about two gallons of wort (the whole can of extract and all other ingredients with less water), then add it to three gallons of cold water in the primary fermenter. This addition of cold water also aids in cooling the wort to yeast-pitching temperature.

There's nothing wrong with boiling a small volume of wort, then topping up with cold water. Although many people successfully use tap water, to be on the safe side you can pre-boil the water you are going to add in the fermenter. This should be done a day before brewing, and a rolling boil should be maintained for at least 10 minutes. This ensures that no bacteria are alive in the water, and it allows chemical changes, such as dropping out temporary hardness, to occur in the water being boiled. The boiled water should then be moved into sealed, sanitized containers and placed in the refrigerator for use on brewing day.

There is a little side effect that causes a lot of confusion here. When a brewer boils less than five gallons of wort, then brings the volume up to five gallons by adding water in the fermenter, it is almost impossible to get an accurate hydrometer reading. Boiling the ingredients for five gallons of beer in two gallons of water produces a very concentrated wort, of course. When that concentrated wort is poured into three gallons of water, the heavy stuff goes to the bottom.

Even with vigorous stirring, it is practically impossible to mix the wort well enough that an accurate sample can be taken for a hydrometer reading. This has no effect on the beer because thorough mixing does take place after fermentation starts.



White River Porter
(5 gallons)

This is a great London porter, a little sweeter and heavier than is usual for this style. The color can be determined by the dry malt extract the brewer chooses. Using a light extract will produce a brew about the color of root beer. Dark malt extract will make it black.

Ingredients:

- 0.5 lb. dark crystal malt (crushed)
- 0.5 lb. chocolate malt (crushed)
- 6 lbs. dry malt extract (unhopped) (light, amber, or dark)
- 0.5 lb. malto-dextrin
- 1 oz. Cluster hop pellets (8% alpha acid) for 60 min.
- 0.5 oz. Target hop pellets (10% alpha acid) for 30 min.
- 1/2 tsp. Irish moss
- 0.75 oz. Ultra hop pellets (3 % alpha acid), for 2 min.
- 2 packs Doric dry yeast or 1 packet Wyeast 1028 London ale yeast
- 3/4 cup corn sugar for priming

OG = 1.058
FG = 1.020

Step by Step:

Put the crushed grains in a cheesecloth bag and put that into 5 gals. of cold water in the brewpot. Turn on the heat, and move the grain bag around while the water is heating. When the water reaches 170° F, remove the grain bag. Bring the water to a boil, turn off the heat, and stir in the extract and malto-dextrin. Return it to a boil and stir in the Cluster pellets. Boil hard for 30 minutes and stir in the Target pellets. Boil 15 more minutes and add the Irish moss. Boil 13 more minutes and add the Ultra pellets. Boil 2 more minutes.

Cool rapidly to under 75° F, preferably with a wort chiller. Siphon or pour into a primary fermenter, and pitch the yeast into the stream. Leave protein trub and hop particles behind in the brewpot. Ferment with an airlock in the primary fermenter, and move to a secondary fermenter when the foam subsides. Bottle when the beer is flat, still, and clearing. Dissolve the priming sugar in the beer, then siphon to sterilized bottles and cap. The beer will be good in three weeks and at its best in three months.

— Sam Wammack

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Boiling Tips

Malt extract may scorch on the bottom of the brewpot, and care needs to be taken to avoid that. Scorching caramelizes the malt, and it will change the flavor and color of the beer. When adding malt extract to the boiling water, turn off the heat under the brewpot. Make sure the malt extract is stirred in thoroughly before turning on the heat again. During the boil stir periodically to avoid scorching on the bottom of the pot.

Try stirring with a metal spoon so you can tell if malt extract is sticking to the bottom of the pot. It's hard to tell with a plastic or wooden spoon, but with a metal spoon you can feel the metal-to-metal contact on the bottom of the pot.

In the first 10 minutes or so of the boil, a malt extract beer will often try to boil over. For some reason dry malt extract seems even foamier than malt extract syrup. In the early part of the boil, watch carefully and control the heat. When foam starts to rise, cut the heat and stir the wort to break down the foam. Dashing a little cold water on the foam helps keep it down. The pot will usually try to boil over two or three times, then the foam breaks down and there is no further problem. This effect is called a "hot break," and it is caused by protein breaking down in the boil.

After the hot break, protein particles are still present in the wort, but they are of very small size and can't be seen. Later, when the finished beer is chilled, these protein particles will clump together and become visible. This is what causes "chill haze" (a type of cloudiness) in beer. Chill haze does not affect beer flavor but is a visual detractor. Commercial breweries usually cure this problem by chilling the beer just before bottling, then running it through a micron filter to remove the protein. Of course this removes the yeast too, but commercial breweries don't rely on this residual yeast for carbonation.

Since homebrewers usually use natural carbonation, a different solution is needed. A good method is to add one-half teaspoon of flaked Irish moss to the brewpot 15 minutes before the end of the boil. Irish moss is a natural seaweed that has a negative electrical charge. When Irish moss flakes encounter the positively charged protein particles in the boil, the particles bond together and sink to the bottom of the brewpot.

The Big Chill

One of the most important things in good brewing procedure is rapid and effective wort chilling. After the boil, beer wort needs to be cooled to

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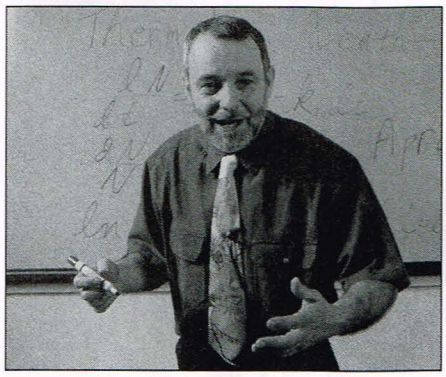

Important as it is, a great recipe will only take you so far. In the increasingly competitive craft brewing scene, the future will belong to the brewers offering the highest quality beer. Every aspect of production must be scrutinized and managed for quality, consistency and efficiency.

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about 70° F before the yeast is pitched. If this can be accomplished rapidly, a couple of good things happen. First, the wort is at risk of bacterial infection after it is cooled below 140° F. The more quickly it is cooled to 70° F, the yeast pitched, and the liquid sealed into a sanitized fermenter with an airlock, the better. Second, rapid and effective wort chilling will produce a "cold break." That is, the protein particles will coagulate into large, heavy flakes and drop to the bottom of the brewpot. This effect is aided by the Irish moss that was thrown into the boil, and a good cold break prevents chill haze in the finished beer.

There are many ways to cool beer wort to pitching temperature. Any way that works very quickly and doesn't add anything to the wort is fine. Don't add ice or refrigerated water unless it was previously boiled and stored in sealed, sanitized containers. Many brewers like to use an immersion wort chiller in the brewpot. An immersion chiller will drop five gallons of boiling wort down to pitching temperature in about 15 minutes.

Adding one more step to your brewing process can really improve the clarity of your beers. You can chill the wort in the brewpot, but when the temperature gets down to about 90° F, stop stirring the wort. If the wort is left undisturbed during the last few minutes of chilling, all the protein and hop particles will drop to the bottom of the brewpot. When the temperature reaches 70° F, siphon — don't pour — the wort into the primary fermenter. The siphoning assembly should be sanitized, of course. The intake end at the brewpot is held about one-half inch below the surface of the wort. The outflow end is clamped all the way at the top of the primary fermenter. This makes the beer splash and gain oxygen as it falls into the fermenter.

By siphoning from the surface of the liquid in the brewpot, you are able to move the intake end downward as the liquid falls. When all the clear wort is siphoned out, stop siphoning, leaving the junk in the bottom of the brewpot behind. One handy trick is to pitch the yeast directly into the stream going into the fermenter.

Brewing beer, whether from malt extract or all-grain, is a lot of fun. Grain brewing is a bit cheaper, but it takes more time. Extract brewing is faster but a bit more expensive. The best grades of malt extract have improved to the point that there is no significant quality difference between the two brewing methods. It all comes down to the preference of the brewer. Like a lot of homebrewers, you might enjoy making good beer both ways!

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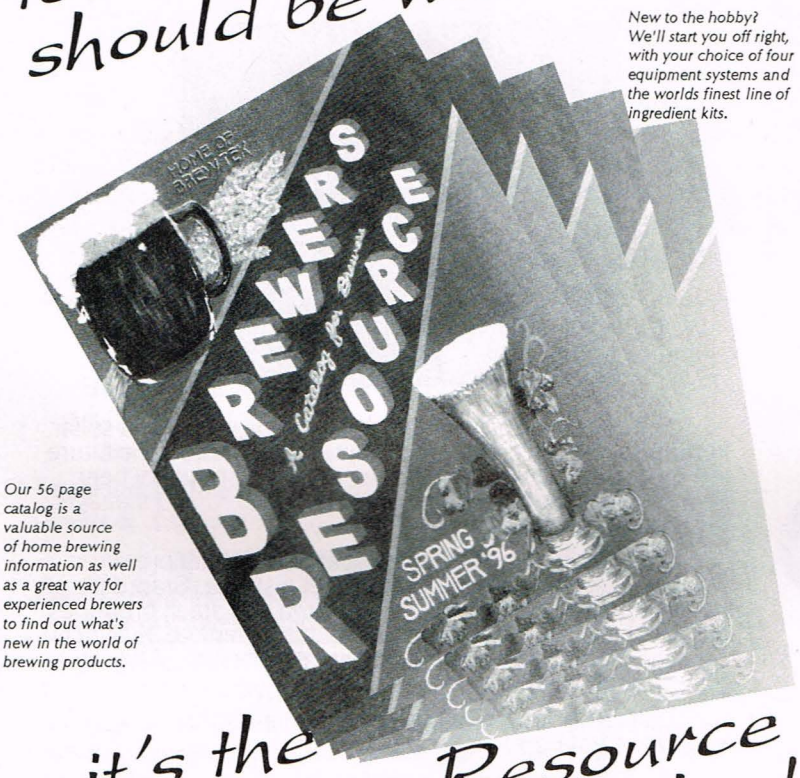

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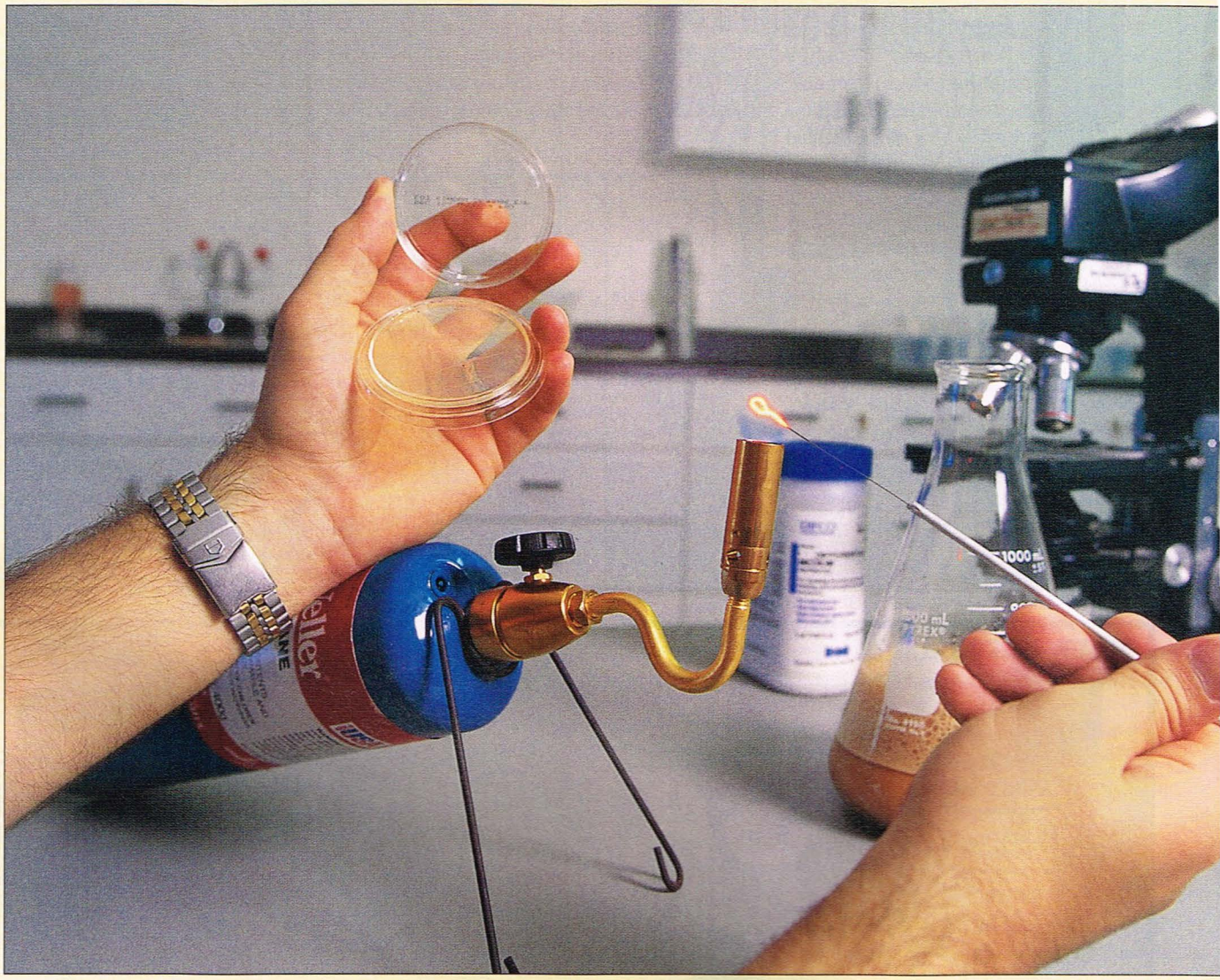

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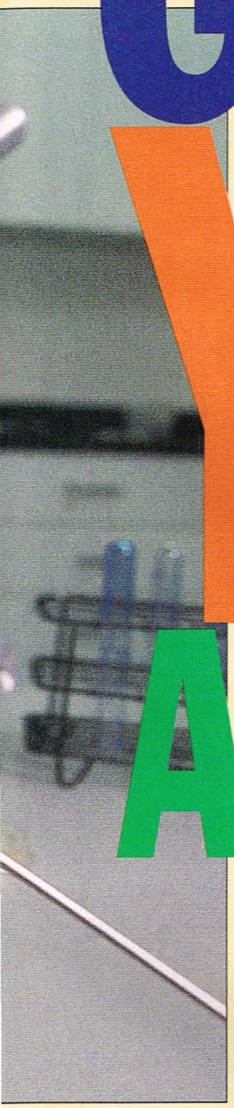


by Scott Lowry

The flavor of your award-winning homebrew owes itself primarily to the yeast that was used to ferment it. But how can homebrewers with limited time and resources be sure that the yeast they are using is up to the job? A little knowledge about yeast and a few easy techniques can go a long way toward improving your brew. Here's how.

The yeast that we desire must be 1. in sufficient quantity, 2. healthy, 3. free of other microorganisms.

It is up to the yeast supplier to provide a healthy and pure yeast culture, and it is usually up to the brewer to both grow and take care of this yeast. Yeast cultures may be purchased in one of three forms: dried, liquid, or on a slant.

Liquid Diet

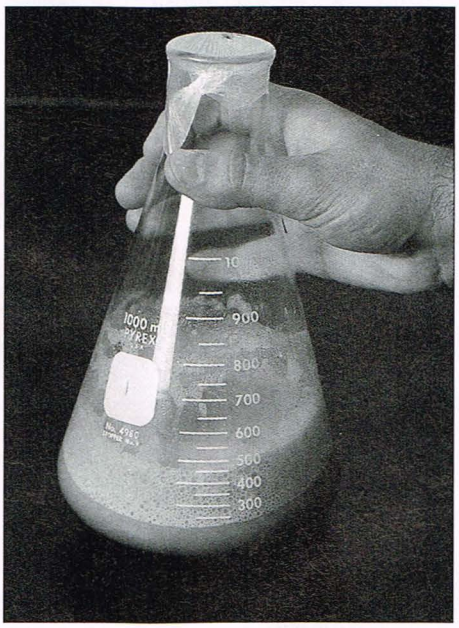
Dried yeast is probably the easiest to use. The trick to working with dried yeast is in rehydrating the yeast and pitching enough of it for a vigorous fermentation (see box, page 45).

The best way to add dry yeast is by hydrating it approximately one hour prior to use. There are several ways to do this. Here's one:

Boil 400 to 700 ml of tap water in a 1,000-ml flask. Remove the flask from the heat. Place a cotton plug in the top. Spray the cotton with 70 percent ethanol (grain alcohol mixed with water), and place the flask into a pan of ice water. This produces bacteria-free, cool water in about 20 minutes. Next, shake the flask to aerate the water, then pour the yeast into this pre-boiled water.

If you believe that this boiling/cooling step is unnecessary or too much work (as many homebrewers do), you may just rinse a glass with 25- to 50-parts-per-million iodophor solution and use regular cool tapwater.

Liquid "smack packs" are a



A 1,000-ml Erlenmeyer flask comes in handy for many operations involving yeast, such as rehydrating dry yeast and propagating more liquid yeast.

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Enough Is Enough

Dried yeast is easy to use, but it's important to pitch enough. According to the suppliers of the dried yeast, a typical sample contains 20 billion (2×10^{10}) cells per gram. That's four yeast cells for every man, woman, and child on earth in each gram of dried yeast!

The viability (percent of living cells in this sample) is 60 to 80 percent. Using an average viability of 70 percent, this means there are 14 billion (1.4×10^{10}) living cells per gram of dried yeast.

To determine how many grams of yeast to pitch per liter of wort, start with a target pitching rate. The rule of thumb is to use 1 million (1×10^{6}) cells per milliliter of wort for each degree Plato. Plato is another way to measure specific gravity.

Since most beers begin with a wort original gravity of 12° Plato (1.048), a good target pitching rate is 12 million cells (1.2×10^{7}) per milliliter of wort. This is the same as 12 billion (1.2×10^{10}) cells per liter.

With these numbers in mind, the grams of dry yeast to be added to a brew may be determined by the following:

$$\frac{\text{Grams of dried yeast required}}{\text{liter of wort}} = \frac{(1.2 \times 10^{10} \text{ cells/liter of wort})}{1.4 \times 10^{10} \text{ cells/gram dried yeast}}$$

Thus, to add yeast at the concentration of 12 million cells per milliliter, 0.86 grams of dried yeast per liter of wort (0.11 ounces/gallon) must be used.

popular selection among homebrewers. These liquid-yeast packages contain yeast that is healthier than dry yeast, and a larger percentage of the yeast cells in a liquid pack are alive. According to Wyeast Laboratory, a liquid yeast package that is less than 30 days old contains approximately 100 million yeast cells per milliliter of solution (a total of 5 billion cells for a 50-ml pack). Viability of more than 90 percent is common. Viability decreases quickly, however, and after 30 days of storage may be as low as 50 percent (50 million cells per milliliter).

Additionally, the smack pack contains a small pouch filled with wort (yeast starter solution). When this pouch is ruptured, the yeast in the package will grow to approximately 500 million cells per milliliter (a tenfold increase). If one pack of yeast

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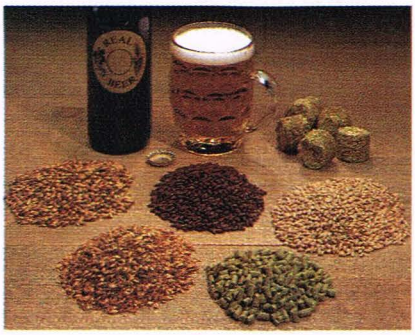

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were pitched into a five-gallon batch of beer, the total concentration of yeast cells would be 1 million to 2 million cells per milliliter.

If the brewer is pitching into a low-gravity, well-oxygenated, cool wort, this might suffice. Otherwise it will be necessary to propagate more yeast. One very simple procedure that can be used to increase the pitching rate follows. To use this method you will need a 1,000-ml Erlenmeyer flask with drilled stopper (cost $7 to $9, available at homebrewing or lab supply stores), some cotton balls, a fermentation lock, dry malt extract, a small scale, a funnel, a six-quart or larger pot, your kitchen stove, and a 70 percent ethanol solution (diluted grain alcohol).

First, measure three ounces of dry malt extract and pour it through the funnel into the flask. Fill the flask with 750 ml of very warm water, then stir until mostly dissolved. Heat this wort solution, stirring occasionally, until boiling. Boil for 15 to 25 minutes.

Place the stopper with the fermentation lock on the flask and move it from the stove into a pot filled with cool water. The steam from the wort should kill any bacteria on the stopper and in the fermentation lock.

Spray a cotton ball (or dab it) with the ethanol solution and put it in the top of the fermentation lock. As bacteria from the air is drawn into the cooling wort, it should be killed by the ethanol solution. After about five minutes remove the cooling water from the pot and add ice water.

When the solution has cooled to 65° to 70° F, shake it vigorously to aerate it. This is now a sanitary (though not quite sterile) starter solution and should be pitched immediately after aerating.

When adding the yeast to this starter, be sure to sanitize the outside of the yeast package. Iodophor may be used to do this, although the iodophor must remain in contact with the package for an extended time to do its job.

Here's an option: Instead of rinsing the outside of the package with a sterilizing solution, use a lighter. Sterilize the scissors or knife with the flame, open the package,

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then sterilize the opening with the flame. Once the yeast is in the starter, give it a shake or two. It should take off fermenting in four to 12 hours.

Billions and Billions

This 700-ml starter will eventually contain 60 million to 80 million cells per milliliter at high kraeusen (peak fermentation). With this concentration of yeast, approximately four to six liters of beer could be pitched at the proper rate of 10 million to 12 million cells per milliliter.

The rule of thumb in the brewing industry is to use a tenfold increase in volume when propagating yeast. If you were to use this starter to pitch a five-gallon batch (19 liters), the beer would be underpitched by three to five times. This is better than just adding the smaller amount of yeast provided by the manufacturer, but if you want to do better, another starter of a larger quantity or several 700-ml starters can be made from the first starter.

Yeast may also be purchased in the form of a slant. Slants are small tubes half filled with a wort or "yeast nutrient" solution. This solution has been mixed with agar (a solidifying agent produced from Japanese seaweed), usually at a ratio of 12 grams of agar to one liter of wort.

Yeast is added to this nutrient solution as it cools. To use this form of yeast, the brewer needs an inoculation loop, a flame source, and a sterile wort starter. These items may be obtained from yeast culture suppliers or lab suppliers.

The best place to obtain yeast for your next award-winning batch is from your previous batch.

The first stage of yeast growth is begun by simply flaming the inoculation loop, allowing it to cool within an inch or two of the flame, rubbing some yeast on the loop, and quickly transferring it to the sterile starter. (For a more thorough review of aseptic techniques, see Pierre Rajotte's book, *First Steps in Yeast Culture*).

The cap to the starter should be placed tightly on and loosened each day to allow carbon dioxide to escape. After two or three days, vigorously shake the starter to bring all the yeast into solution, flame the outside of the small starter bottle, and pour the solution into a 700-ml starter.

Sterile wort starters may be either purchased from a supplier or made by the brewer. If the brewer is going to make a starter, an all-malt wort of approximately 1.040 original gravity works well. This may be pre-

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gravity works well. This may be prepared by mixing two ounces of dry malt extract with 500 milliliters of water. After boiling and cooling, pour the clear liquid off the solid hot-break material. This clear liquid may then be poured into test tubes, capped loosely, and heated in a pressure cooker. After the pressure cooker cools, tighten the lids to the test tubes. This sterile wort starter should be kept cool until used.

Yeast Storage and Handling

The best place to obtain yeast for your next award-winning batch is from your previous batch. After a batch ferments, there are approximately four to eight times as many yeast cells as you need to pitch the next batch. Taking this healthy yeast from the bottom of your fermenter and using it again is both easy and free. Here is some advice on keeping this yeast in the best condition possible.

If you don't remove the hot break (the brown, snowflake-looking stuff) from the bottom of your kettle, you will probably want to transfer the beer after about three days of fermentation. This will remove the solid matter, the proteinaceous trub, from the fermentation and keep it out of the finished beer. It will also remove any hops, as well as dead or early flocculating yeast cells.

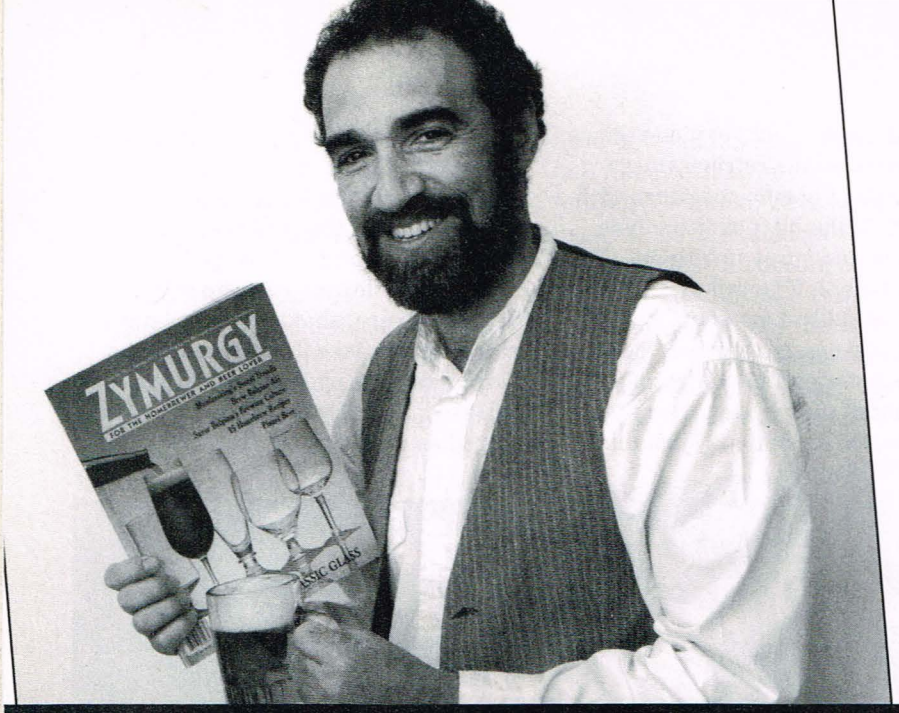
When transferring the fermenting beer from one fermenter to the other, try not to splash it, which would introduce oxygen. The receiving fermenter may even be purged with carbon dioxide, if available. The result is a layer of pure, live yeast at the end of fermentation.

When fermentation ceases (indicated by no bubbling of the fermentation lock and a final gravity of roughly 1.005 to 1.015), it is time to transfer the beer to the bottle or keg. Siphon the beer off the yeast and have a sanitized food storage container (such as Tupperware) nearby.

Leave about one-quarter inch of beer on top of the yeast and swirl this beer around until it is saturated with yeast. Quickly pour it into the food storage container and cover with the sanitized lid. *Do not put it in a glass jar.* Some fermentation may still take place and the jar could explode! Place the container in the refrigerator.

Try using a plastic container with a small hole in the lid. Cover the hole with cotton and spray it with 70 percent ethanol. If stored at 32° F to 34° F, it should last for about two weeks. If you desire, you may make another starter and pitch it with just a small amount of the yeast slurry you have collected, or you may just dump the slurry into your next batch of beer.

When storing yeast, it may be necessary to occasionally shake the yeast solution. This will keep hot areas from forming and add oxygen to the slurry, thus slowing the rate of yeast death. Beware, shaking the yeast will cause an increase in pressure as the carbon dioxide within the solution is released. Liquid yeast slurry should be stored as close to freezing as possible,



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CIRCLE 5 ON READER SERVICE CARD

while dry yeast should be frozen for optimal storage. Dry yeast may last up to 18 months if frozen, although viability will decrease significantly.

Evaluating Yeast

Brewers have several ways to determine whether the yeast they are using is up to its fermenting task. The primary method is to stain it with methylene blue solution and observe the yeast under a microscope. Yeast cells that stain blue are dead.

The best way for a microscopeless homebrewer to determine the health of a sample of yeast is through observation. If a strain of yeast is used over and over again to ferment beer, it may eventually show signs of wearing out. The flavor of the beer it produces is the most obvious (and the most important) sign of the health of the yeast.

The percent change in gravity, called the apparent attenuation, is another indicator. If similar mashing procedures are used, the terminal gravity of successive batches of beer fermented with the same yeast should be approximately the same. If the terminal gravity rises, it may be due to premature settling (flocculation) of the yeast. The clarity of the beer is mainly due to yeast flocculation and is an indicator of yeast performance. If beer is less clear than it used to be, it may be due to a change in the flocculation characteristics of the yeast.

Finally, the amount of time for fermentation to begin and to be completed is another indicator. If fermentation is slow to begin, it is probably due to underpitching but may also be a result of the loss of yeast viability.

Yeast is one of the most important flavor contributors to beer. Consistency can only be achieved by using a similar yeast strain under similar conditions. Knowledge, experimentation, and record keeping will help any brewer learn to use yeast over and over again to create consistent, award-winning beers.

Create Your Own Brewing Spreadsheet

by Scott Lowry

While jotting down brewing notes on the back of receipts and scratch paper may work for the short term, an organized and more permanent log will keep you brewing great beers consistently.

Are you a serious homebrewer? If so, are you able to reproduce beers that you have brewed in the past? If not, perhaps you need to keep better records. The key to good record keeping is knowing what information to keep and what to omit. Spreadsheets are an easy and fun way to sort this information and make it presentable.

Popular spreadsheets on the market are Excel, Quattro Pro, and Lotus 1-2-3. It doesn't matter which one you use, as they can all perform the basic calculations required in brewing.

The spreadsheet that we will set up is aimed at the all-grain brewer. If you are using extracts, we will explain how to make the necessary modifications. The program will allow you to formulate a recipe. It will also track the brew, calculating extraction efficiencies and other useful information.

Metric Madness

Every brewing system is different. Therefore, 10 pounds of grain in one system might be equal to eight pounds in another system. This difference is called extraction efficiency.

Instead of basing a recipe on pounds of grain used, select the original gravity you'd like for the beer and calculate the weight of grain required to reach that gravity. Thus, the first entry on the spreadsheet is the starting gravity (SG) of the beer. This may be converted to degrees Plato (DP), another measure for specific gravity (see box, page 52). Don't be daunted; this calculation is the most complex on your spreadsheet.

A much easier, though not quite as accurate, way to figure this is to take the last three numbers of the specific gravity and divide by four. The equation looks like this:

DP = [(SG-1)/4] x 1,000

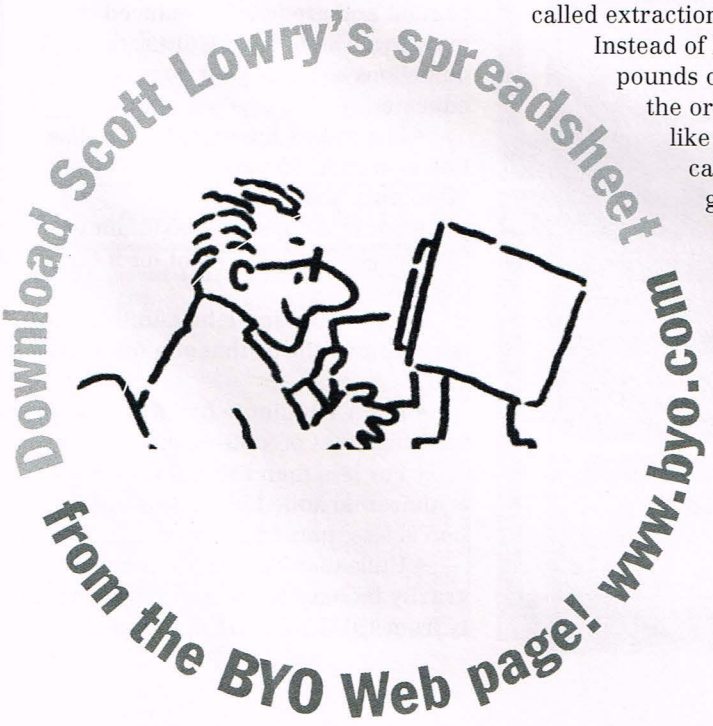
Next, we must decide how much to brew. This is the post-boil volume (PBV). The PBV is larger than the "knockout" volume — the amount that actually makes it into the fermenter — due to the loss of the solid material, called trub, that remains in the kettle. The loss will vary depending on whirlpool techniques but is generally 5 to 10 percent. You may enter this in any unit you choose, but it should be converted to liters since this is the unit of measurement for our calculations.

1 gallon = 3.7853 liters = 0.03226 barrels

Malt Calculations

Each brewing system has its own extraction efficiency. This is based on the theoretical yield of the grain based on the brewing equipment and techniques employed. Yield is the percent of fermentable materials contained in the grain that becomes dissovled in the wort.

The theoretical yield of two-row pale malt is approximately 80 percent. For most specialty grains it is slightly lower (77 percent). Most brewing systems will only yield about 68 percent from two-row grain and about 65 percent from speciality malts. If you don't know your system yield, use these two numbers.



Next, we will choose the amount of speciality grain (grain other than the base pale malt) used in the batch. However, instead of choosing the weight of speciality grain, we will choose the percent of specialty grains in the total grist. After entering the percent of each speciality malt, the spreadsheet will compute the percentage of pale malt.

% Pale Malt =
100% - Total of speciality malts.

Now each of these percents can be used with the other information to determine how much malt you need. PBV (post-boil volume) should be expressed in liters, and percent of grist and extraction efficiency should be expressed as decimals (50% = 0.50).

$$\text{kg. malt} = \frac{(SG)(DP/100)(PBV)(\text{percent of grist})}{\text{extraction efficiency}}$$

Use this equation for an exact conversion of specific gravity to degrees Plato.

$$DP = [(SG)^2\ (-205.347)] + (668.72)(SG) - 463.37$$

Kilograms of malt may be converted to pounds:

1 lb. = .4536 kg
2.205 lbs. = 1 kg

If you're using dry malt extract, the extraction efficiency is about 98 percent. For canned malt you may use 85 percent. This is a very rough estimate, but after completing the brew we will figure the exact extraction efficiency. You may then use this number for future brews.

Calculating Bitterness

Now that the grist has been determined, we must decide how much hops to use. Figuring utilization for hops is more of an art than it is for grain. The amount of hops required is determined by the desired bitterness, the alpha-acid content of the hops, and the extraction efficiency.

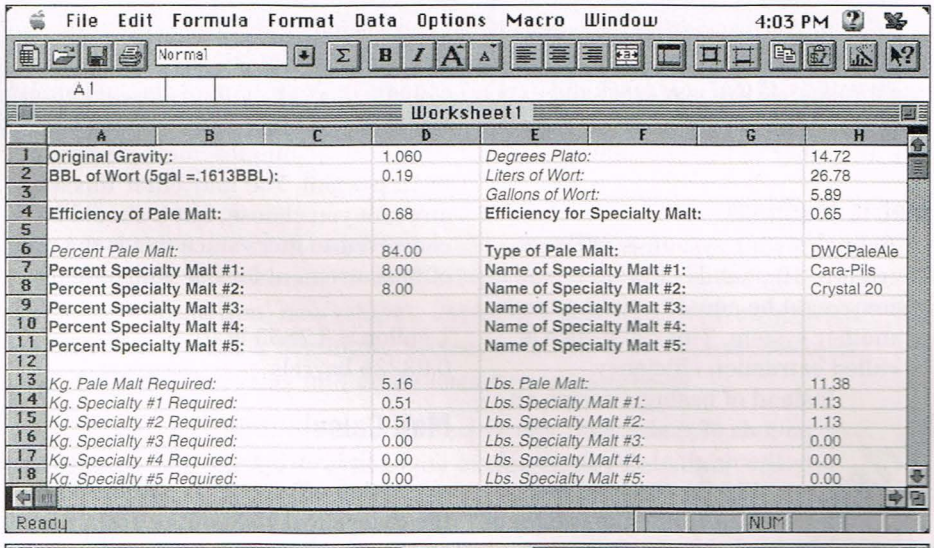
First, select the desired amount of bitterness in International Bitterness Units (IBUs). This is the same as the total iso-alpha-acid concentration in the finished beer (measured in milligrams per liter). It is the presence of these iso-alpha-acids that give the beer its hop bitterness. An average lager may have 15 to 20 IBU, whereas an IPA or barleywine could have 50 to 70 IBU.

Next, select the number of hop additions, the type of hops, the time in the kettle, and the alpha-acid content of each hop. Enter these values as in the example at left. Choose the percent of the total bitterness you want to come from each hop. The greater the percentage of bitterness coming from the late hop additions, the more hop aroma and flavor there will be.

Finally, enter the utilization of the hop (the art part). Hop utilization is defined as the weight of alpha acid added to the kettle that is dissolved in the finished beer.

Without the use of a spectrophotometer, we cannot determine hop utilization and are instead reduced to guessing. The following are some guidelines to make your guess more educated:

- For pellets the maximum utilization is around 35 percent for a 60- to 90-minute boil.
- For leaf hops the maximum utilization is 28 to 30 percent for a 60- to 90-minute boil.
- For a 30-minute boil, utilization is about two-thirds that of a 60-minute boil.
- For a 10-minute boil it is around one-third that of a 60-minute boil.
- For less than five minutes there is almost no added bitterness (utilization is less than 5 percent).
- Utilization decreases as specific gravity increases. An increase in gravity from 1.037 to 1.067 may cause



	A	B	C	D	E	F	G	H
1	Original Gravity:			1.060	*Degrees Plato:*			14.72
2	BBL of Wort (5gal =.1613BBL):			0.19	*Liters of Wort:*			26.78
3					*Gallons of Wort:*			5.89
4	Efficiency of Pale Malt:			0.68	Efficiency for Specialty Malt:			0.65
5								
6	*Percent Pale Malt:*			84.00	Type of Pale Malt:			DWCPaleAle
7	Percent Specialty Malt #1:			8.00	Name of Specialty Malt #1:			Cara-Pils
8	Percent Specialty Malt #2:			8.00	Name of Specialty Malt #2:			Crystal 20
9	Percent Specialty Malt #3:				Name of Specialty Malt #3:			
10	Percent Specialty Malt #4:				Name of Specialty Malt #4:			
11	Percent Specialty Malt #5:				Name of Specialty Malt #5:			
12								
13	*Kg. Pale Malt Required:*			5.16	*Lbs. Pale Malt:*			11.38
14	*Kg. Specialty #1 Required:*			0.51	*Lbs. Specialty Malt #1:*			1.13
15	*Kg. Specialty #2 Required:*			0.51	*Lbs. Specialty Malt #2:*			1.13
16	*Kg. Specialty #3 Required:*			0.00	*Lbs. Specialty Malt #3:*			0.00
17	*Kg. Specialty #4 Required:*			0.00	*Lbs. Specialty Malt #4:*			0.00
18	*Kg. Specialty #5 Required:*			0.00	*Lbs. Specialty Malt #5:*			0.00

Worksheet1

	A	B	C	D	E	F	G	H
1	Total Iso-Alpha Acid Desired:			45.00				
2								
3	First Hop: Cluster:				Second Hop: Cascade:			
4	Time in Kettle (mins):			60.00	Time in Kettle (mins):			30.00
5	% Alpha Acid:			6.80	% Alpha Acid:			4.90
6	Desired Alpha Acid Fraction(%):			60.00	Desired Alpha Acid Fraction(%):			30.00
7	Extraction Efficiency (%):			35.00	Extraction Efficiency (%):			8.00
8	*Hops Required for Batch (kg):*			0.03	*Hops Required for Batch (kg):*			0.03
9	*Hops Required for Batch (lbs):*			0.07	*Hops Required for Batch (lbs):*			0.07
10	*Hops Required (ounces):*			1.07	*Hops Required (ounces):*			1.18
11								
12	Third Hop: Cascade:				Fourth Hop: Goldings:			
13	Time in Kettle (mins):			8.00	Time in Kettle (mins):			0.00
14	% Alpha Acid:			4.90	% Alpha Acid:			5.00
15	Desired Alpha Acid Fraction(%):			10.00	Desired Alpha Acid Fraction(%):			0.00
16	Extraction Efficiency (%):			8.00	Extraction Efficiency (%):			1.00
17	*Hops Required for Batch (kg):*			0.03	*Hops Required for Batch (kg):*			0.00
18	*Hops Required for Batch (lbs):*			0.07	*Hops Required for Batch (lbs):*			0.00
19	*Hops Required (ounces):*			1.08	*Hops Required (ounces):*			1.00

utilization to decrease from 28 to 23 percent.

- Utilization decreases as total IBUs (bitterness units) increase.
- Utilization increases with length and rigor of the boil.
- Foaming and boilover can greatly decrease utilization. Hop iso-alpha-acids cling to foam and the sides of the kettle.
- For beginners: 60 minutes = 33%, 30 minutes = 22%, 10 minutes = 10%.

The amount of hops required may now be determined (again, percents are expressed as decimals):

$$g\ hops = \frac{(IBU)\ (liters\ of\ wort)\ (desired\ a\text{-}acid\ fraction)}{(\%\ a\text{-}acid)(extraction\ efficiency)\ (1{,}000\ mg/g)}$$

Grams of hops may then be converted to pounds or ounces:

1 lb. = 16 oz. = 453.6 kg

For the final hop addition, the time (0) and desired alpha-acid fraction (0) were entered to signify that these hops were being added to the whirlpool for aroma and would provide almost no bitterness.

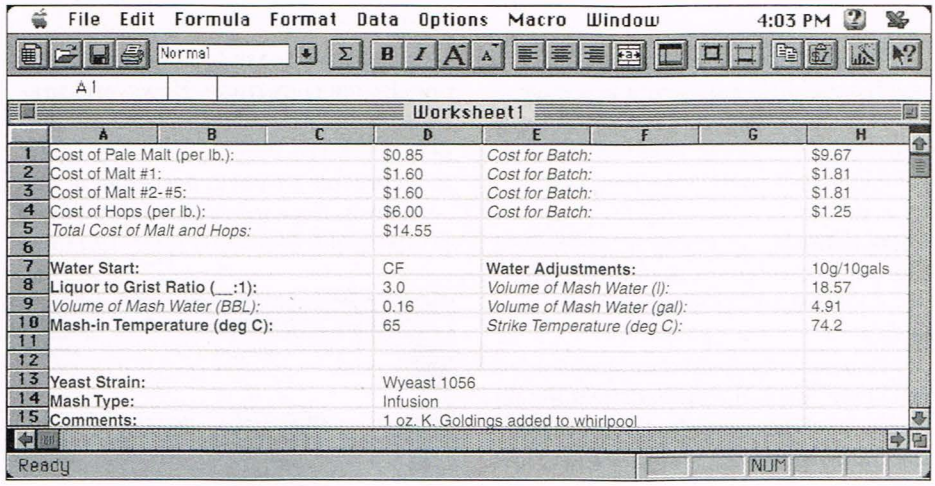
The cost of malt and hops were computed by adding the total weights and multiplying this sum by the cost per pound.

Mash Calculations

I noted any necessary water adjustments but did not choose to have the spreadsheet figure them.

Correction Table

Temperature (F)	Specific Gravity Correction
50	-.69
60	0
70	+1.105
80	+2.39
90	+4.01
100	+5.91



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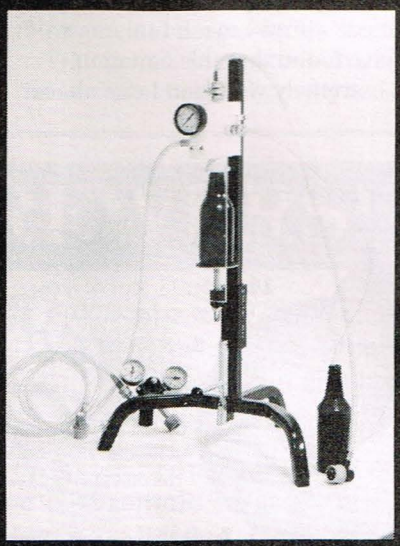

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CIRCLE 54 ON READER SERVICE CARD

The liquor-to-grist ratio of the mash should be selected (3 is a good value for an infusion mash and 4 for a decoction). The volume of mash water (VMW) may be determined:

VMW in liters =
(Total weight of malt in kg) x
(Liquor to grist ratio)

Choose a mash-in temperature (MIT) and have the spreadsheet determine the strike temperature (ST) by the following:

$$ST = \frac{(\text{Kg malt})(1.6)(\text{MIT}-20)}{(\text{VMW})(4.18)} + \text{MIT} + 3$$

All temperatures are expressed in degrees centigrade, and 1.6 is the specific heat of the malt, 4.18 is the specific heat of water, 20 is the temperature of the grain before mashing in, and 3 is a fudge factor for heat lost to the outside air and mash tun.

I have found that this equation works extremely well, and I can almost always hit my mash temperature within one degree centigrade. However, I preheat my mash tun and work in a temperate environment, so you may want to adjust this equation accordingly.

I chose a yeast strain and mash profile and left a small space for additional comments. This recipe fits on a single sheet of paper.

Putting It to Work

Everything thus far has been based on theory. Page two of the spreadsheet is the reality — trying to hit the num-

Worksheet1

	A	B	C	D	E	F	G	H
1	Mashing Schedule (Time)			Decoction		Temperature (deg C)		Temp (deg F)
2	0			none		65.5		149.9
3	15					65.5		149.9
4	30					65.0		149.0
5	45					64.5		148.1
6	60					64.5		148.1
7								
8								
9								
10	Gravity of First Runnings:			1.085		Gravity of Last Runnings:		1.010
11	Pre-Boil Volume (gal):			7.8		Post-Boil Volume (gal):		6.0
12	Knockout Volume (gal):			5.2		*Knockout Volume (liters):*		19.684
13						*Knockout Volume (BBL):*		0.168
14	Original Gravity:			1.0600		*Original Extract (deg P):*		14.72
15						*Extraction Efficiency (%):*		66.01
16								
17	Fermentation Date and Time:			3/9, 1500				
18	Yeast Strain:			1056		Generation:		3rd
19	Pitching Rate:			.4 ml slurry		Pitching Temp:		74 F
20	Fermentation Temp:			85 F		Fermenter Type:		Glass
21								
22	Gravity after ____ Hours:			48, 1.055		Gravity after ____ Hours:		72, 1.048
23	Gravity after ____ Days:			12, 1.019		Gravity after ____ Days:		
24								
25	Apparent Terminal Gravity:			1.017		*Apparent Extract (deg P):*		3.70
26	*Apparent Attenuation:*			70.62%		*Calories (per 12 oz.):*		187.20
27	*Alcohol % w/v:*			4.31%		*Alcohol % v/v:*		5.51%

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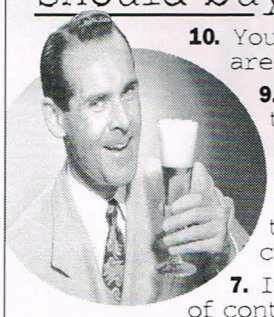

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CIRCLE 37 ON READER SERVICE CARD

bers and analyzing the results. I use a blank page two and fill it in with pencil on brew day. I transfer the data to the computer later.

The first section is a record of the actual mash temperatures. I record everything in degrees centigrade. Remaining is a column for decoctions if needed.

Since mash temperature determines enzyme action and malt extraction, it is very important to keep an accurate record. For infusion mashes I used to check the temperature every 15 minutes, but I now know exactly how much heat my mash tun loses. For temperature-controlled mashes you may want to record temperatures more often.

I record the specific gravity of the first and last runnings. If the gravity of my last runnings is high (greater than 1.010), I know that my lautering procedure is inefficient. I also record the pre-boil volume and gravity of the wort. If I want to hit a certain specific gravity, this information can tell me how long to boil. A rule of thumb is 10 percent evaporation equals 11.5 percent gravity increase, and 20 percent evaporation equals 25 percent gravity increase. Remember that specific gravity is based on a temperature of 60° F. (See correction table, page 53).

The post-boil volume (PBV) of the wort is the volume on which all of my figures were predicated. It is also the volume used to determine extraction efficiencies. This volume differs slightly from line two on page one of the spreadsheet because it is measured at 212° F and line two is computed for 60° F. I use a long dowel, which I have calibrated with water at 60° F, to measure all kettle volumes.

The next value, the "knockout" volume, is the volume of the wort in the fermenter. I recommend permanently marking each fermenter in half-gallon increments. Original gravity (OG) is

File Edit Formula Format Data Options Macro Window 4:03 PM

Normal

A1

Worksheet1

	A	B	C	D	E	F	G	H
1	Conditioning Date and Time:			24 March	*Degrees Plato:*			14.72
2								
3	Temperature:			32 F	Number of days:			17 days
4	Finings:			none	Filtration:			2 Micron
5	Kraeusening:			none				
6	Date of packaging:			10 April	Temperature:			35F
7	Pressure:			11 psi	Vol. of CO2 from table:			2.6
8								
9	Color:				Clariy:			crystal clear
10	Body:				Head Retention:			average
11	Bitterness:			med-high	Maltiness:			med
12	Hop flavor:			fruity	Diacetyl:			not perceived
13	Esters:			none	Off flavors:			
14								
15	Additional comments:			Excellent recipe from BREW YOUR OWN				
16				Great fruity hop flavor!				

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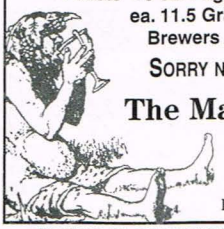

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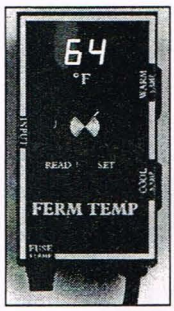

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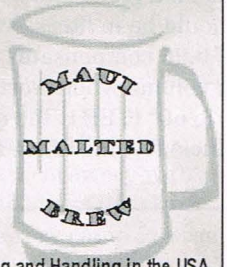

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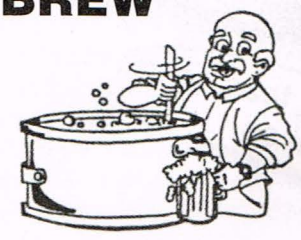

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recorded as the cool wort exits the kettle. This is converted to degrees Plato as in the first equation. Use the simple method — the last three digits of specific gravity divided by four — or the more accurate and complex calculation in the box on page 52.

Now your system's actual extraction efficiency (EE) may be determined:

$$EE\ (\%) = \frac{(PBV \times 0.96)(OG)(OE)}{\text{Total Kilograms of malt used}} \times 100\%$$

OE should be expressed as a decimal (12° Plato = 0.12) and PBV should be in liters. A correction factor of 0.96 compensates for the decrease in volume when wort cools from 212° F to 60° F. EE is the overall extraction efficiency; the efficiency of the pale malt is actually slightly higher (0 to 2 percent) than this number and the specialty malt is slightly lower (1 to 3 percent). Use these extraction efficiencies to refine your next batch. Once you have made several batches, you can pinpoint your accuracy and gain control over your system.

The fermentation date, time, strain, generation, pitching rate and temperature, and fermenter type are all recorded. Gravity readings may be taken (though are not necessary) to monitor fermentation. Apparent Terminal Gravity (ATG) is recorded, and from this several estimated values may be obtained.

Apparent Extract (AE) is the Apparent Terminal Gravity converted to degrees Plato.

Here are more equations used on the spreadsheet. Original Extract (OE) and Apparent Extract (AE) are expressed as decimals.

$$\text{Apparent Attenuation (AA)} = (OE-AE)/(OE) \times 100\%$$

$$\text{Alcohol \% volume} = \frac{(OE-AE) \times 100\%}{2}$$

$$\text{Alcohol \% weight} = (\text{Alc \% volume})(.794/ATG)$$

I conclude my spreadsheet with information about conditioning and packaging. Because I use kegs, I record the temperature and pressure to obtain the volumes of carbon dioxide. Taste comments are provided by several willing subjects.

I urge everyone serious about brewing to develop a spreadsheet suited for their own use. Every brewer and brewing system is unique and in a constant state of change. The format I use has undergone several major modifications in the past several beers. I am assuming it will change just as much in the future. ■

Longtime homebrewer Scott Lowry is brewmaster at Bay Brewing Co., an Annapolis, Md., startup, and a graduate of the University of California, Davis, brewing program.

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A Little Brewery With Big Aspirations

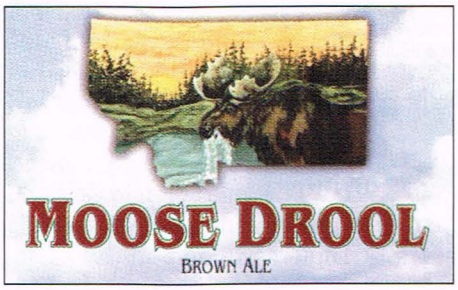
by Steve Johnson

Big Sky Brewing in Missoula, Mont., is a little brewery with aspirations as big as the sky. The idea for the brewery came to Brad Robinson and Neal Leathers while brewing five-gallon batches of beer in Robinson's kitchen.

Robinson and Leathers had been homebrewing together in Missoula for about six years before they decided to start their own commercial brewery. Like many homebrewers they had nurtured a closet dream of someday turning their hobby into a business. People kept telling them, "If you could brew this commercially, I would buy it," according to Robinson. "There was another brewery in town, and we figured if it could be done once there was a pretty reasonable chance it could be done a second time," he says.

Brad Robinson and Neal Leathers produced, directed, and starred in a local access television show, "Beer Talk." While the 30-minute program was tremendously popular, it didn't bring in investors for their microbrewery as planned.

Despite their lofty aspirations, they encountered a few roadblocks along the way, including no money, no commercial brewing experience, and no experience in opening or operating a business. "As a first step, we started honing our skills at homebrewing and doing research to try to be as well versed as possible in the industry. That way when we came across investors who had any savvy, we wouldn't get stumped" Robinson explains.



Moose Drool is no laughing matter; the brewer claims it is the number-three selling beer in Missoula, Mont. — behind Bud Light and Bud.

But a funny thing happened to Robinson and Leathers on their way to opening their brewery. With the help of the local community access station's series of courses on television production and Robinson's background in telecommunications, the pair managed to produce, direct, and star in their own television program about beer. The idea behind their unique marketing ploy was to gain recognition in the community and to lure potential investors.

"Beer Talk" consisted of the partners tasting and talking about different commercial beers in front of the camera. Robinson says they didn't write a script, and each segment was basically a stream of consciousness. The 20- to 30-minute episodes were filmed in Robinson's basement. Commercial sponsors were not allowed, so not only did they work for free, but they also had to buy their own beer.

The few times they allowed call-ins, the response was overwhelming. On one show they received 40 phone calls in 30 minutes.

"We had a lot of fun doing the show, but the truth is, none of the investors were found directly through the

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program," Robinson confesses. "Investors were mostly family and friends. Among them, probably 40 invested less than $10,000 each. So they are the kind of people we can relate to, just ordinary people who like good beer."

When the pair opened the microbrewery, they had invested about $700,000. Of that, $225,000 was a Small Business Administration loan. Robinson and Leathers enlisted Bjorn Navozney, a Swedish student majoring in business administration at the University of Montana, to write their business plan for one of his business classes. Then they hired him as an intern for the summer to finish the business plan. The three formed a partnership and only two months after finishing the business plan, Novozney became president of the company. Now, how's that for rapid promotion? Each year they rotate among the offices of president, secretary, and treasurer. This allows each to experience the responsibilities that come with the different positions.

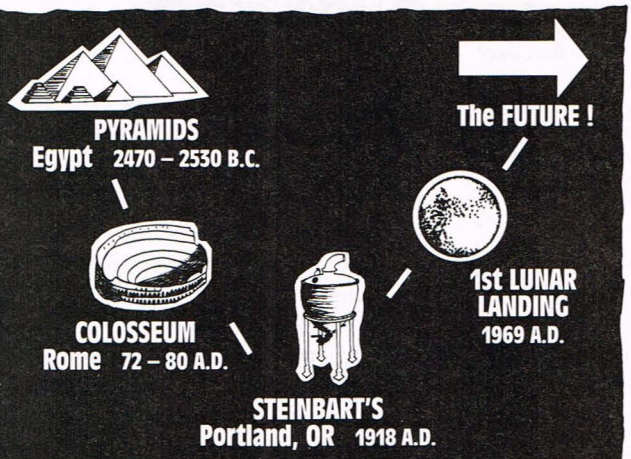
Initially, Leathers concentrated on the technical aspects, Novozney on the business, and Robinson on brewing. Novozney has no brewing background but is learning from Robinson and Leathers, who in turn learn business strategy from Novozney.

At the end of 1994, the trio found a site for the brewery and began renovating the building, which took almost six months. It was a long, narrow building constructed during World War II on an old railroad siding.

Instead of buying a package of equipment from one manufacturer, they bought individual components from different manufacturers.

They bought their 30-barrel brewhouse from Ripley's, a Canadian firm. The two 60-barrel fermenters and single bright beer tank were made by the Paul Mueller Co. of Springfield, Mo. A local company built the grist hopper, installed the stainless, copper, and steam piping, and put the facility together.

The brewery went into production in June of 1995. In the first six months the partners made 675 barrels of beer. Demand skyrocketed around the first of this year and production doubled. By



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the summer they found it necessary to install a third 60-barrel fermenter. Now their beers are available in kegs from the Billings-Missoula area to Spokane, Wash. After the first six months the three partners quit their day jobs to devote their full energy to the brewery. In addition they have hired two full-time employees. Robinson's father, Russ, runs the taproom and Novozney's brother, Kris, sells, brews, and cleans.

Brad Robinson believes the styles of beer and the names they chose are important to their success. They picked English-style ales, which were perfect for the hard water they have in Missoula. They don't have to treat the water other than removing the chlorine with an activated charcoal filter.

Their flagship beer is a Northern English brown ale called Moose Drool. It's made from a recipe Robinson worked on for several years as a homebrewer. They also make Scape Goat (golden ale), Bobo's Best Bitter, and Powder Hound (an English strong ale). Their latest release is an oatmeal stout called Slow Elk, which is the tongue-in-cheek name given by locals to cows that are shot during elk season.

They are trying to keep their ales as British as possible. Their primary bittering hop is East Kent Goldings. For yeast they use Fuller's from London. Five different pellet hops are used for flavoring and aroma: Kent Goldings, Crystal, Willamette, Liberty, and Saaz. They have begun to experiment with whole-leaf Willamette, Mt. Hood, and Fuggle in the Bobo.

The tasting room is open Monday through Friday from 2 p.m. to 5:30 p.m. Tours are usually held on Thursday and Friday. Customers can visit their World Wide Web site at www.graphi.com/bigskybrew.html.

Big Sky Brewing is located at 120-A Hickory Street, Missoula, Mont. To get there from Interstate 90, take the Orange Street exit and go south. From there it's about 1.5 miles to the Clark Fork River. After crossing the river, turn west on Cregg, which intersects Hickory. For more information call (406) 251-3079. ■

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

The circa-World War II building was used to build wooden pallets, produce glassware, and silk-screen t-shirts before giving way to the brewery. The equipment was pieced together from the best of many manufacturers.

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A Nylomaniac Tells His Story

by Dave Gallagher

All right, all right, I admit it: I am a nylomaniac. It's not as bad as it sounds though, and if you'll allow me the opportunity to explain, you could be one, too!

Like you, I am a homebrewer. I love to brew beer, and I have a special love for hops. According to the epic tome of the homebrew-meister Charlie Papazian and to information I recently read right here in *Brew Your Own*, this makes me a lupomaniac. Very well, I accept the designation with pride. With a large grain of salt I accept the fact that the mortgage, car payments, and kids severely limit my brewing budget. The need for frugality (certain aquaintances refer to this as clam-buttedness) is what made me a nylomaniac.

I love my hops, and I need to harness my pellets in some fashion before placing them in the wort. A classy hops bag at my local homebrew shop costs more than three ounces of noble hops. I needed a cheap, effective method of hopping the wort while keeping residue to a minimum.

I pondered the problem as I sat in my usual thinking room. We have a lovely fine-mesh strainer, but the wife won't let me touch her kitchen gadgets after she caught me stripping the line off my spinning reel with her mixer. (I thought the dough-hooks worked fine.) I briefly considered my bass net, but the mesh was too big to contain the pellets. Hmm. I was about to admit that I would have to pay for something (anathema to a do-it-yourselfer) when I raised my eyes in a last appeal for inspiration and found the solution. Hanging on the shower rod were three pairs of my wife's nylons.

Now I've always been fond of nylons, especially when she wears the ones with the, well, that's another story for another magazine! Suffice it to say that as pleasing as they have always been, I suddenly considered an entirely new use for nylon stockings.

"Oh, honey..." I crooned.

"What?!"

"Can I have a pair of these nylons on the shower rod?"

"*What*?! No! You can have a pair when they get a run in them!"

"Well..." I said as I deftly returned my nail clippers to my front pocket. "This pair appears to have a run in them."

Seconds later she was examining the pair in question. "Hmph! Don't know how I missed such an obvious cut. And so cleanly done, too." She eyed me, and I quickly put on my choirboy face. "Well, I guess you can have them."

Dave Gallagher: a man who knows what to do with a pair of nylons.

I immediately hot-footed it down to my workshop. First I stretched the nylons out by pulling them on over my pants. I didn't mind the odd sensation, but the gas-meter man gave me the strangest look as he made his way, more rapidly than usual, up the stairs. I removed the nylons and proceeded to cut them into six sections of equal length, three per leg. Then, using the same thick thread I use to "whip finish" my salmon flies, I tied off one end of the nylon, creating a bag.

Next, I got out my pound of Cascade hop pellets from the basement freezer and carefully weighed out 11 ounces on the powder scale I use for reloading my ammo for skeet shooting (we do-it-yourselfers are a resourceful lot!) and placed the pellets in the bag. They fit with room to spare. Time for the test. I tied off the top of the bag, tossed it in my bait bucket, and put my propane plumber's torch to work. In short order I had a lovely hops tea with a mild smelt aftertaste. The bag held up perfectly, and very little residue remained in the bucket when I removed the nylon bag. I was in business! I used the bags for my next batch of beer, and everything went perfectly! Of course, even though they were entering a boiling environment, I sanitized the bags. After all, I knew where they'd been.

So that's how I became a full-fledged nylomaniac.

You too may indulge in my brand of recycling — you have a wife, right? You don't even have to create the runs yourself — women do it on their own with toenails and fingernails. A steady supply is available regularly. Why buy milk when you've got a cow at home, eh? Women brewers have the inside track, as they provide their own. Heck, even single men have sisters, or at least mothers. Just stretch 'em, tie 'em, and use 'em. The nylons, I mean. You too will be a nylomaniac.

Of course if you choose to live outside your budget, you can purchase nylons new. Just let me know when you go; I want to hear what you tell the clerk at the register! ■

Do you have a story for Last Call? Write to Last Call, c/o Brew Your Own, 216 F St., #160, Davis, CA 95616.

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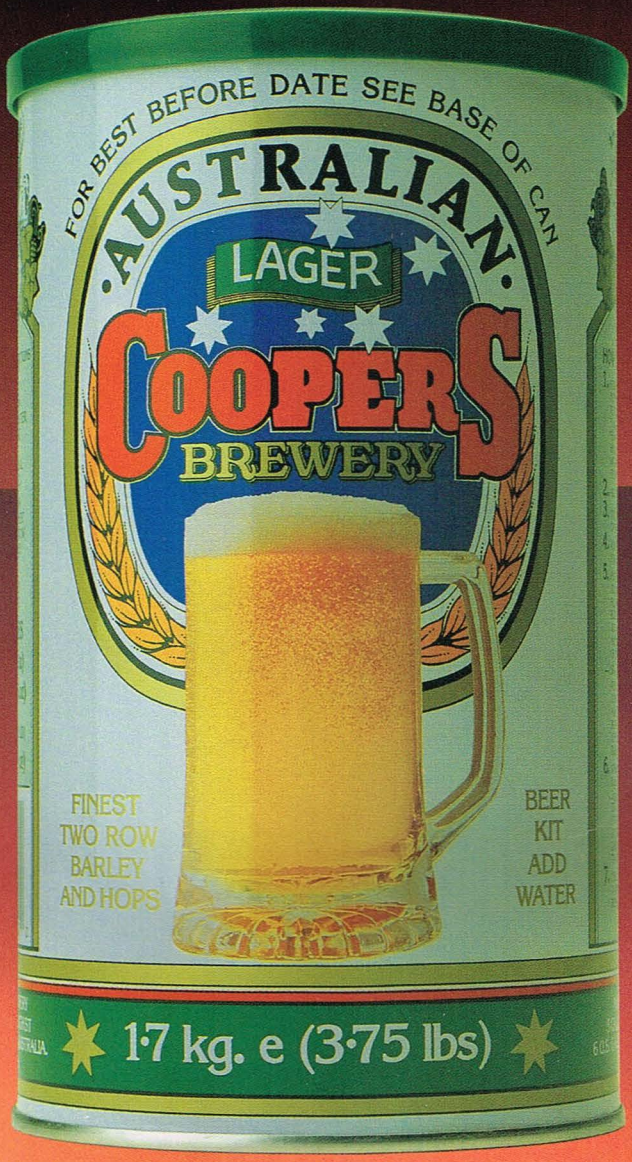

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