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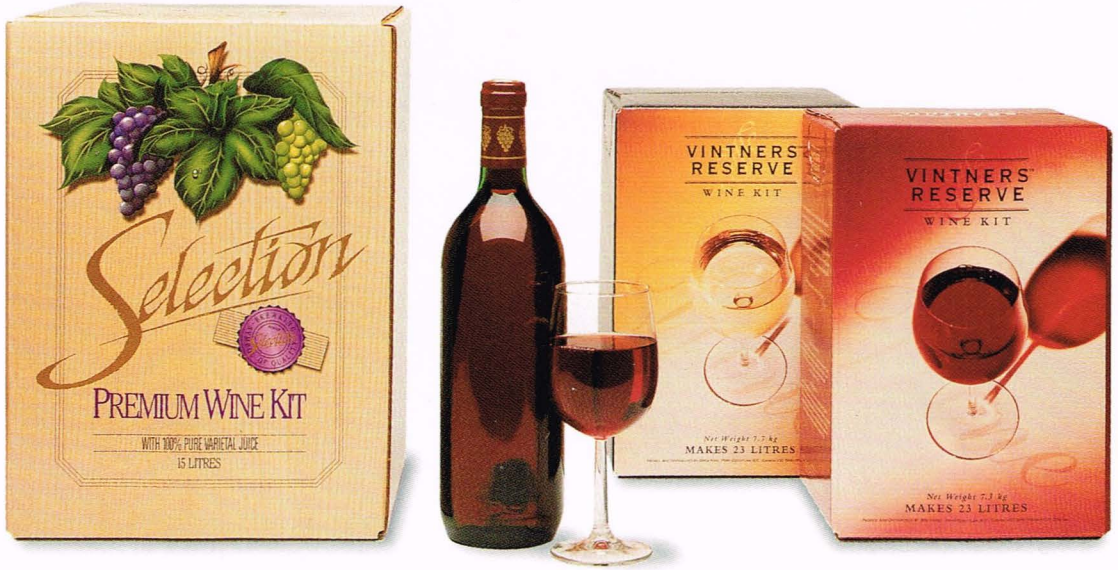
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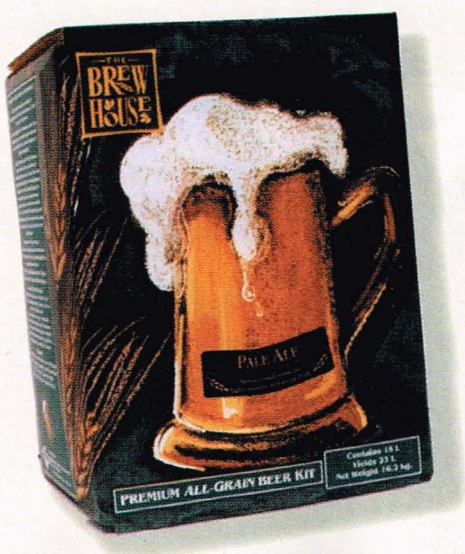
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Cover photo: Kent Lacin

Creating Special Occasions

Prompted by this month's cover feature, I've been thinking lately about special occasions.

Basically there are three types:

A. Weddings and Graduations.

B. Holidays and Birthdays.

C. Cleaning the Garage.

Type A's are the once-in-a-lifetime events that make everybody feel happy and make you truly want to do something special to celebrate.

Type B's are the events that come around regularly. They're still fun, but you get used to them. There's a regular routine you follow when you celebrate. Plastic noisemakers for New Year's Eve. Charred hamburgers for the Fourth of July. Fights about lumpy or non-lumpy gravy at Thanksgiving. For some people — Liz Taylor comes to mind — weddings fall into this category.

Type C's are special because you don't do them every day. On the other hand, who'd want to? Going to the dentist falls into this category.

The way I see it, living the good life is a matter of maximizing your Type B's (maybe that's what Liz has in mind) and minimizing your Type C's.

Now, for me at least, brewing is a special occasion. Here's my reasoning. First of all, there's not enough brew time in the world. Even though I have nominal control over when I brew, the actual time becomes available at irregular enough intervals that I truly feel like I'm enjoying something special.

Second, brewing's therapeutic. There's a great feeling about settling down in the kitchen for a few hours and creating something that people will enjoy. And if others don't, I know I certainly will.

Beyond that, there's the process of brewing. There's creativity, there's the tactile aspect of handling the hops and grain, there's the social aspect of enjoying a beer during the mash rest or the boil.

For me brewing is a definite Type B occasion. And since I now know I'll live a happier life if I maximize my Type B's, I've decided to declare some brewing occasions, times for which beer must be brewed. Think of them as brewer's holidays. I was going to limit my list to 10, but the more I thought about it, the more came to mind. Here's a sampling.

Bought a new car. Bought a used car. Tuned up the car.

Finished a big project at work. Started a big project at work. Made it to work on time all week. Made it to work on time yesterday.

Won big at the track. Won a few bucks in the football pool. Won a plastic Barney playing Skeeball. Bought a lottery ticket; matched two on the Pick Six. Played the slots; lost less than usual.

Missed the sale on porter at the supermarket. The supermarket's sold out of porter. Didn't have time to stop at the supermarket. The supermarket doesn't sell beer, anyway.

You get the idea. This month's cover feature offers ideas on how to make that beer special, whether you're brewing for a wedding, a graduation, or because the fire department arrived (hey, read the article). The story begins on page 36. And if you still need a special reason to brew, here's my favorite:

The carboy's empty. Time to enjoy a Type B.



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DOG BYO 11/97

A Brewing Bellydancer



Eris Weaver
Rohnert Park, Calif.

By day I manage a small research library. By night I assume a more glamorous line of work; I am a professional belly dancer. I perform at fairs, festivals, theaters, and private parties around Northern California both as a soloist and with my troupe, Gypsy Caravan.

My love of beer has, ahem, blessed me with an abundance of belly to work with. But fuller figures are considered more attractive by Middle Easterners. Inspired by "Outlaw Brewer in Saudi Arabia" (January '96 BYO) and the name of another troupe, Arabian Spice Co., with which I was dancing at the time, I created an Arabian Spice beer. I'm still working on the recipe, which I will undoubtedly share with BYO readers when I'm satisfied with it. Among the ingredients are date sugar, malted wheat, and cardamom.

Following the great belly dancing tradition of dancing with objects (swords, trays, pots) balanced on one's head, I am working on a comedy piece involving a tray of beer mugs and a costume made out of — what else? — bottle caps.

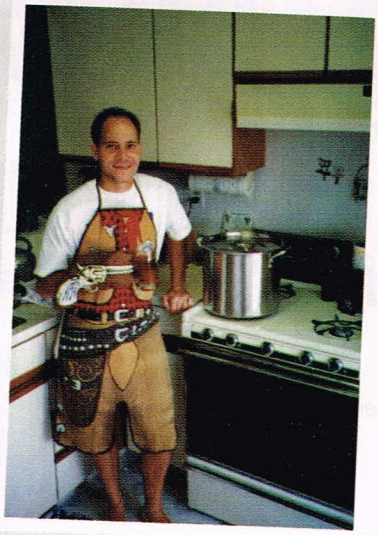
I've shared my homebrews with co-workers and sister dancers alike. And yes, I've even belly danced in my library. Who knows what career and hobby I'll take up next?

Mike Stotz
Mundelein, Ill.

My wife, Bev, and I live by a few ground rules in our house: 1) First one up in the morning walks the dog. 2) The last brownie goes to the baker. 3) When you travel, bring home a souvenir (the tackier the better).

Well, my wife outdid herself on a recent trip to Dallas. She found a cowboy apron and matching six-shooter hot mitt in a hotel souvenir shop. Of course I loved it. But unlike most souvenirs, this one had a practical side for homebrewing.

I'm all for remembering a good batch of beer, but I'd rather keep the memories in the bottle, not on my clothes in the form of splashed boiling wort. So the "chaps" come in handy when the brewpot is put into action.



Stick 'em up, partner!

Brewing at 60

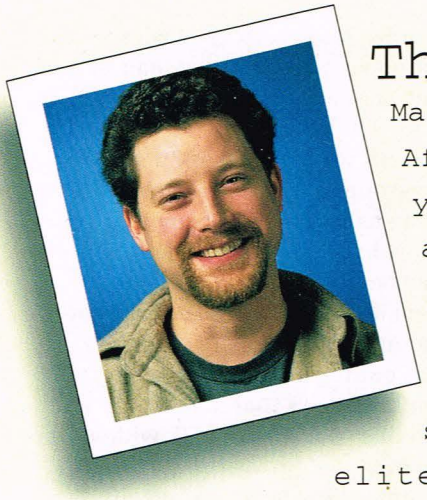
I am 60 years old. I started brewing at 58, when my house was flooded. I had to find a place to stay where I could keep my menagerie of three birds, one dog, and four cats, plus myself and my husband. The only person who would take us all in for a short-term stay was my son who lives in Davis, Calif.

My son was finishing his chemistry degree at the University of California, Davis, and had started brewing beer. He had five batches of brewing under his belt. I wanted to do something totally different to take my mind off the flood, so I started brewing beer and got captivated.

I had heard stories about homebrewers in

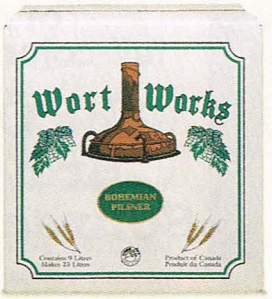
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This is Sean. He's our beer guy.

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











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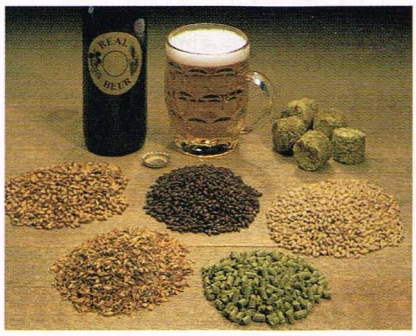
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the 1960s. Most of these stories were about how a person's brew had blown up and scattered glass and beer all over the kitchen and inside the refrigerator. Brewing beer was all very underground then, not open and thriving as it is today. My mother-in-law was brewing "cumis," a milk beer. My husband says his grandmother brewed it first. It was made in a bottle containing a siphon with a knob to siphon out the amount you were going to drink. He says that it was fizzy and tasted like carbonated milk without the clabber.

I started my beermaking with lambic. Actually a kriek. I got the ingredients and a book and was told by the shopkeeper that he hadn't met anyone who had tried making it, that it was a hard ale to make. After reading the book I called my son to come and help me make the yeast starter. After a week there was no indication that the yeast was working. I used it anyway. After a while the wort started fermenting and blew off its fermenter lid and sent the lambic wort spewing over in the closet. At racking time the wort was slimy. I almost threw it out, but I remembered reading in my son's homebrewing book that every brew improves with aging. After it was racked another time and yeast was added with the bottling sugar at bottling time, the brew tasted pretty good.

My daughter has moved back to live with me. She helped me bottle and it was a riot. My son had told me to clean my mouth with some alcohol. We chose vodka and after many tries to start the siphoning and trying to bottle, my daughter and I were exceedingly drunk. It was at that time that she decided she liked brewing, too.

Since that time I have concentrated my brewing on lambics, meads, fruit ales, and Belgian ales. I enjoy brewing and my husband enjoys drinking. All my brews have been good. I find every brewing and bottling session has its different problems and aura. I think weather, mood, and temperature have a great deal of influence on the taste of the brew.

Frances Besne
Orangevale, Calif.

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A Siphon Boost

The folks at Grape and Granary in Akron, Ohio, offered me a suggestion I thought was pretty slick. Instead of siphoning from the carboy, one of the guys there told me he attaches a CO_2 tank and gives the carboy/siphon arrangement just enough pressure to push the beer out or to start it flowing. Though I don't mind the little bonus taste of beer when I siphon, I'm sure it's much safer for all concerned if the brewmaster isn't sucking on the siphon tube when bottling the beer.

I got the advice because I acquired a beer engine (manual pump) while in London and have been trying to figure out how to hook it up. It doesn't need the pressure to dispense because it is a pump and I didn't want to expose the vessel containing the beer to air. I've read about bilge pumps, but I needed to know how to keg when dispensing with a pump. (I'd like to be a real purist and avoid introducing CO_2 to the beer.)

The suggestion that I got from Grape and Granary should work if I give it only enough pressure to fill the void that was created by the beer exiting the carboy. As a closed system, this method should avoid contamination problems.

Perry A. Trunick
Akron, Ohio

No-Mess Carboy Cleaning?

How can you say that the carboy cleaner you featured in "Carboy Cleaning Made Easy" (August '97) is a no-mess system when you have to take it out on your lawn, like a sprinkler system, to use it? That raises another question: Can you only use this on odd or even days for those brewers living in a drought-stricken or water-restricted area?

What does a guy like me, living in Michigan, do in the winter months? I guess I could put on the ice skates to go out and get my frozen carboy.

If I don't use it for a few weeks, how much harmful algae and bacteria is growing inside from what you call the "vertical supply pipe" to the sprayer head? Or do you drain this no-mess cleaner by turning it upside down and letting it drip, once again outdoors? We wouldn't have a mess that way.

Mel Sinkel Jr.
Sterling Heights, Mich.

If you don't want to get your lawn wet or if you have no outside area available or if the weather is inclement, use the rinser in your bathtub or shower stall. You can use a faucet-to-hose adapter (such as one designed to be used with a wort chiller and bottle washer). These are available at some homebrew stores.

One end of the adapter screws onto the kitchen or bathroom faucet (after the aerator is removed), and the other end has a standard male garden hose connection. Drag your garden hose inside or make up a short section of hose to connect the rinser to the faucet. Your choice.

Regarding water usage, the amount required to rinse a carboy should be about the same as one flush of the ol' commode. You will have to set your own priorities here. Yes, you do turn the rinser upside down to drain it. See, you didn't need us for this one.

Hard-to-Find Pale Chocolate Malt

I saw a recipe called Nosfarantu's Return ("20 Great Extract Recipes," June '97 BYO), which called for one pound of pale chocolate malt. I have tried many stores in the Philadelphia area and cannot locate this malt. Is it possible that it may have another name?

John Cimino
Philadelphia, Pa.

No, it is not sold under another name, but many retailers don't carry it. Chocolate malt is associated with a heavier, more robust and bitter flavor. On the other hand, pale chocolate malt has a lower Lovibond and is softer, smoother, and sweeter. It can be ordered from the recipe's originator, Brew Masters Ltd., in Rockville, Md. Call 1-800-466-9557.

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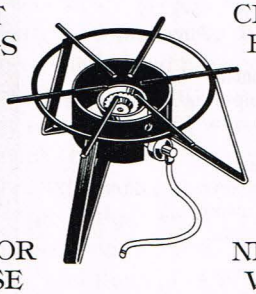
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Highland Holiday

by Scott Russell

Last winter I caught a lot of flack because of my famous (now infamous) Norwegian Jul Ø1 (*Yule Erl*) recipe in "Brewing a Norwegian Tradition" (December '96). Oh, my wife's Norwegian relatives loved it. But not my family. No, they felt slighted. So this year I have to make amends. Therefore, it is with humility and familial affection that I offer a tasty highland treat dedicated to...well, so as not to offend anyone else, dedicated to anyone who loves good beer.

Actually there are a couple of precedents to this ale. After all, what do you think Shakespeare's "weird sisters" were doing when they foretold Macbeth's destiny? Bubble bubble, toil and trouble, and all that? They were brewing 15 gallons of something like this brew. I'd recommend leaving out the eye of newt, though.

And in Braveheart, you know the battle scene when they're all standing there in line with their faces painted blue waiting for the English to charge? Sure the Scots were brave, but I'd be willing to bet someone had brewed up a batch of wee heavy to "bolster" their courage. That was also the scene where the world finally learned the answer to that age-old question about Scots. The answer is "Spandex bicycle shorts." What's the question? Tell ya later.



One note, however. The major winter holiday in Scotland, until recently, wasn't actually Christmas. The Scots celebrated Nov. 30 as Saint Andrew's

Highland Holdiay Ale
(5 gallons, partial mash)

This is a partial-mash recipe mashed at a high temperature. It has a thick mash and a shorter saccharification rest to create a highly dextrinous wort, leaving a fuller, thicker, and sweeter beer.

Ingredients:

- 3.5 lbs. crushed two-row pale malt
- 3 oz. peated malt
- 8 oz. dark crystal malt, 90° to 120° Lovibond
- 4 oz. Munich malt
- 2 oz. roasted unmalted barley
- 2 lbs. plain amber dry malt extract
- 2 lbs. plain dark dry malt extract
- 4 oz. dark brown sugar
- 1 oz. Challenger hop pellets (8% alpha acid), for 90 min.
- 1/16 oz. freshly grated ginger
- 0.25 oz. dried rosemary leaves
- Pinch fennel seeds
- 10-14 g. of a dry ale yeast, or 1 qt. of a liquid slurry (I prefer Wyeast 1728 Scottish ale)
- 2/3 cup corn sugar for priming

Step by Step:

Heat 1.5 gal. of water to 166° F, mash in crushed pale, peated, crystal, and Munich malts and roasted barley. Mash should settle to about 155° F. Hold 75 min., run off, and sparge with 2 gal. water at 170° F. To the kettle add 1 gal. of water, the dry malt, and the brown sugar. Bring to a boil, add Challenger pellets, and boil 90 min.

Turn off the heat and steep (in a mesh bag for ease of straining) the ginger, rosemary, and fennel. Leave standing 30 min., remove herbs, and cool. Put into the fermenter and top off with chilled, pre-boiled water to make 5.25 gal. At 65° F pitch yeast. Ferment cool (60° F if possible) for 10 days, rack to secondary, and condition even cooler (55° F) for two to three weeks. Prime with corn sugar and bottle condition for three to four weeks.

OG = 1.065

Brewing Notes

Non-mash version: Steep roasted barley, peated, dark crystal, and Munich malts as above in 2.5 gal. of water, heat gradually to 170° F, and remove grains. Add 4 lbs. of amber and 3 lbs. of dark dry malt extract and 4 oz. dark brown sugar.

All-grain: Mash 9 lbs. pale malt, 6 oz. peated malt, 1 lb. dark crystal, 2 oz. roasted barley, and 6 oz. Munich at 155° F for 75 minutes in 3.5 gal. Sparge with 4.5 gal. at 170° F. Boil to reduce to 5.25 gal., add hops and herbs as above.

Peated malt: Peated malt is becoming easier to find. It's available at most homebrew supply shops. There is no substitute, but if you can't find it you can just leave it out.

Herbs and variations: Substitute heather honey (if you can find it) for the brown sugar. Or use heather flowers and/or lavender (ask your homebrew shop to get them for you) in the herb mix. Be careful with the ginger. It is meant as an accent, not a featured flavor, and a little goes a long way.

Want to play with yeast? This would be really interesting with a recultured slurry of Belhaven or Traquair's yeast. Or maybe a Belgian Trappist yeast...Hmmm.

Day, an old pagan holiday modernized and adapted by Christian missionaries in the Middle Ages. It more closely resembled our Halloween than Saint Patrick's Day, on which the ghouls and spirits of the dead walked the night (some say vampires as well). Saint Andrew was an Irish monk who felt called to go to Caledonia (Scotland) and convert the heathens. Whether or not he succeeded is open to debate. All this to simply say that if you have time to brew this for Nov. 30, it would be a more appropriate way to fortify yourself against the spirits of the night than a necklace of garlic.

Reader Recipes

Sam's Old World Lager
(5 gallons, partial mash)

This is a very quaffable recipe for any time of the year.

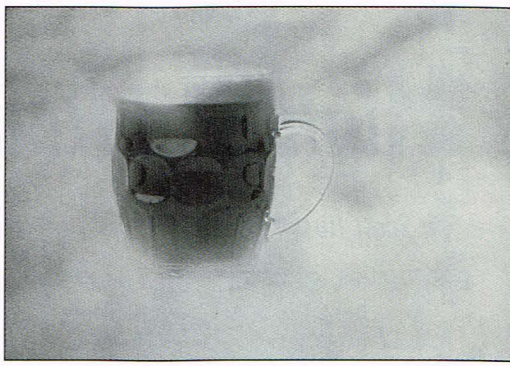
Greg Foreman
The Home Brewery
Collegeville, Texas

Ingredients:

- 1 lb. crystal malt, 10° Lovibond
- 6.6 lbs. Yellow Dog malt (pale malt extract)
- 1 oz. Hallertauer hops (4.1% alpha acid), 0.5 oz. for 60 min., 0.5 oz. for 30 min.
- 0.5 oz. Tettnanger hops (4.2% alpha acid), at end of boil
- 1 tsp. Irish moss
- Wyeast 2007 (pilsner)

Step by Step:

Steep crystal malt in 6.5 gal. water and remove. Bring to boil and add Yellow Dog malt and 0.5 oz. of Hallertauer hops. Boil 30 min. and add another 0.5 oz. Hallertauer hops. Boil 15 min. more and add Irish moss. Boil 15 min. more. Total boil is 60 min. Add Tettnanger hops at end of boil. Pitch yeast at 60° F or lower. Ferment at 55° to 58° F for seven days in primary and two weeks in secondary at 55° to 58° F. Keg and carbonate at 20 psi. Check after two days. When desired carbonation is reached, reduce to 14 psi.



Smog (Smoke) Stout
(5 gallons, partial mash)

This recipe takes rauchbier to the limit. It is a full-bodied stout using real mesquite-smoked malt.

Gabriel Peabbles
Brew Your Own Brew
Tucson, Ariz.

Ingredients:

- 0.5 lb. wheat malt
- 1 lb. two-row lager malt
- 4 lbs. dark malt extract syrup
- 3 lbs. dark dry malt extract

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- 1 lb. roasted barley
- 1 oz. Fuggles hops (4.3% alpha acid), for 60 min.
- 1 oz. Saaz hops (3.9% alpha acid), for 30 min.
- Wyeast 1007 (German ale)

Step by Step:

Pre-soak mesquite chips in water for 20 min. Smoke two-row lager malt on a screen, turning occasionally for 15 to 30 min. Bring 3 qts. water to 168° F, add grains, cover, and allow to rest 1 hour. Strain and sparge with 1 gal. of 170° F water. Add 3.5 gal. water and extracts. Bring to a boil and add Fuggles hops. Boil for 30 min. Add Saaz hops and boil 30 min. more. Pitch yeast at 75° to 80° F. Ferment at 72° F. Prime as usual and age in bottles at least three weeks.

Chocolate Cherry Stout
(5 gallons, partial mash)

I like my stouts chewy. This beer has everything: viscosity, roast, chocolate, and a head rocky enough to walk across. Try coffee in it.

Tim Doyle
The Home Brewery
Denver, Colo.

Ingredients:

- 1/3 lb. roasted barley
- 1/3 lb. black patent malt
- 0.5 lb. crystal malt, 20° Lovibond
- 0.5 lb. crystal malt, 60° Lovibond
- Cordon Brew (yeast nutrient, heading salts)
- 6 lbs. Briess dark dry malt extract
- 1 oz. Irish Northdown hop pellets (8.6% alpha acid), for 60 min.
- 7 oz. semi-sweet baker's chocolate
- 3 lbs. frozen cherries
- Muntons dry yeast or Wyeast 1084 (Irish ale), and starter
- 1/2 tsp. Irish moss
- 3/4 cup dextrose for priming

Step by Step:

Crush and steep grains in 1 gal. water. Hold at 155° F for 30 min. Pull at 170° F. Continue to boil and add Cordon Brew. When foaming subsides, turn down heat. Stir in extract until dissolved. Bring to boil, add bittering hops, and boil for 40 min. Add chocolate and boil 5 min. more. Add Irish moss and boil 15 min. more for a total boil of 60 min. Chill to 85° F and pitch yeast starter. Steep frozen fruit at 170° F for 20 minutes, cool, and add to secondary. Rack fermented beer on top and allow two weeks in secondary. Prime with dextrose and bottle. ■

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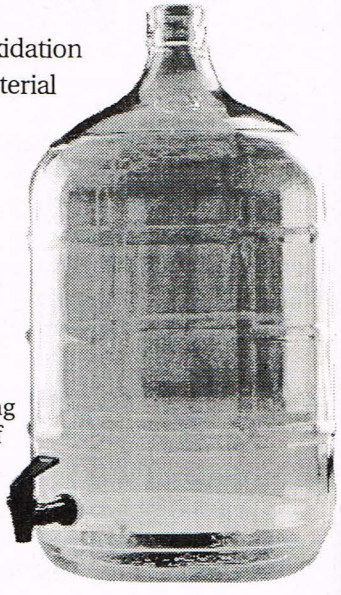
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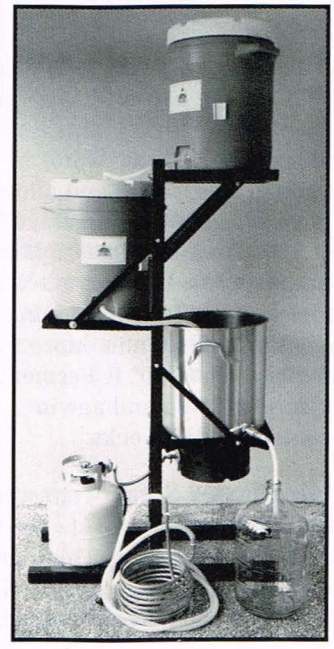
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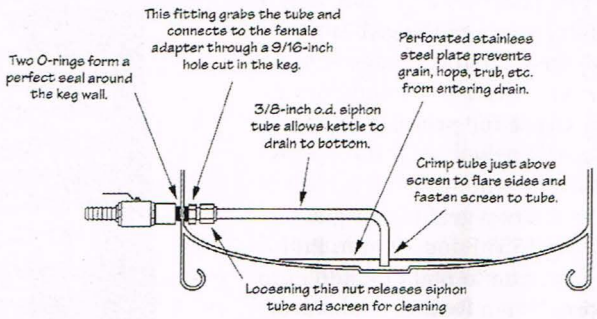
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Failure to Yield

Mr. Wizard

I have a problem with my mash. I don't get very good yield of extract from my grain. In some cases I tracked the poor extract to insufficient crush. However, for most of the beers I have brewed the reason is still a mystery. I suspect that the problem results from poor control of mash temperature.

During mashing I use a floating thermometer with what looks like a steel shot base, which reacts very slowly. After I place the grain in the water, I stir rapidly for a fairly long time and try to get the water up to the starting temperature (it usually requires more heat).



When I think I'm there I turn off the heat, put the lid on the mash, and let it sit. I check it in about 20 minutes and invariably find that the floating thermometer is reading significantly higher than my desired mash temperature. I stir until the temperature looks either a little low or still okay. I go through this for the entire mash time, adding heat once or twice. My fear is that I'm getting hot spots and maybe getting the temperature wrong. It seems that determining the temperature is the hardest part of mashing. What can I do to improve my situation?

Jim McHenry
Denver, Colo.

The big challenge all-grain brewers face is getting the expected yield from their grains. This question is very broad and I will attempt to concisely address this gargantuan topic of extract yield.

The idea behind extract yield is simple: Allow the enzymes naturally present in malt to convert starches to sugar during mashing and then rinse the sugars from the grain bed during the lauter process. The extract yield is the amount of solids (by weight) extracted from the grains during mashing and is usually calculated by using the wort specific gravity and wort volume produced during mashing. The success of mashing, in terms of yield, can be gauged by comparing the amount of extract produced with the amount theoretically possible. This ratio is the brewhouse yield.

Although there are numerous factors that can affect brewhouse yield, there are three biggies: milling, mash temperature, and lautering. Milling is simple; the finer the malt is milled, the higher the extract yield. This simple fact introduces two problems. The first is that if the malt husk is pulverized, the extract may be impossible to separate from the spent grains during lautering. The second problem is that most brewers feel that clear wort is important for good beer, and clear wort is hard to obtain from powdered malt. Brewers have dealt with these issues for a very long time indeed and have come to realize that malt should be milled as finely as possible without causing stuck mashes or cloudy wort. If you want better yield, I would begin by tweaking your crush, because many homebrewers tend to err on the coarse side.

Mash temperature, although very important for the quality of the wort, has a predictable effect on yield. The hotter the mash, the higher the yield. If all you wanted is extract yield — that is, solids dissolved in wort that are measured with a hydrometer — then boiling the mash would give the best yield. Since the ratio of fermentable to unfermentable sugars and the flavor of the wort produced from the mash are also important, a boiling mash fails to meet the other goals of mashing. However, in the pursuit of yield, I would recommend mashing off or raising the mash temperature after mashing to about 170° F. Mashing off reduces wort viscosity, which helps to recover extract during sparging.

The purpose of the sparge is to rinse the extract entrained in the grain particles. A slower flow rate of wort leaving the grain bed will contain more extract than a faster flow rate. Fast flow rates essentially allow the sparge water to move through the bed without leaching wort from grain particles. This is why it is important to regulate the flow rate of wort from the lauter tun. A second factor with sparge water is temperature. Higher sparge temperatures also give higher yields. Most brewers feel that sparge water temperatures greater than about 172° F begin to extract too many undesirable compounds from the grain, so 172° F is a practical upper limit to sparge water temperature.

There are other factors that influence extract yield such as mash pH, mash thickness, mash agitation, and lauter-tun design. These are important to yield, but if you focus your attention on milling, mash temperature, and sparging, you should be able to significantly improve your yield.

Mr. Wizard

I've heard a lot of talk about washing your yeast before refrigerating it, after you recover the yeast from the primary fermenter. But I can't find a single how-to article. Do I use boiled tap water or distilled water? After the water is boiled and cooled, then what?

Steve Eskholme
Syracuse, N.Y.

Yeast washing, like other techniques used to handle and treat yeast, is high on my list of things to do to hone one's brewing skills. Yeast washing is useful when yeast is to be stored and re-used because it removes dead yeast cells, trub, and beer from the good yeast. The overall effect is higher yeast viability (because many dead cells are removed from the population stored), higher yeast vigor (trub interferes with the uptake of nutrients by yeast when it is stuck to the yeast cell wall), and a better environment in which to store yeast since the alcohol from beer isn't the best medium for yeast health.

The method is straightforward. Water, preferably distilled or bottled and free of chlorine, is boiled for 10 to 15 minutes to sterilize it. Water that contains at least 50 miligrams per liter of calcium works best. So when using distilled or low-calcium water, add about 1/8 teaspoon of gypsum per gallon of water prior to boiling. After the water is boiled it should be chilled to at least 38° F before using it for yeast wash water. This process is easier if the water is boiled in canning jars so it can be sealed and cooled after boiling. You can make enough bottles of wash water for months of brewing.

Once the water is sterilized and cold, it is time for the yeast to take a bath. Mix equal volumes of yeast and water in a clean and sanitized container, swirl the mixture gently, and allow it to sit in the refrigerator for at least 30 minutes, preferably one hour, before going to the next step. I typically use the same container the yeast is stored in for this step.

During the cold rest yeast cells will settle to the bottom of the container and dead cells, beer, and trub will separate into the top layer. After these layers have clearly separated, carefully pour off the top layer while not pouring the yeast layer out of the container. If the yeast still contains a lot of trub, a second or even third wash can be used.

Care must always be exercised so as not to throw away the yeast being washed. The calcium in the water aids in this objective because calcium helps yeast to flocculate and helps separate the yeast from the trub, dead yeast, and beer.

The keys to yeast washing are sanitation and care. Whenever you open the container that holds the yeast, spray the top with alcohol, flame the top, or both to maintain "aseptic" conditions.

Mr. Wizard

I have tasted a weisse-type beer at a brewpub while on a trip. It had the most delicious and pronounced banana flavor. My limited brewing knowledge tells me that this is a function of a certain kind of yeast. I want to duplicate this in my next batch of homebrew. What do I need?

Doug Zielke
Coquitlam, British Columbia



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Mmmmm. I can smell it now. The pungent aroma of isoamyl acetate. Picture sipping a frozen cocktail in a tropical paradise. That same aroma is found in beer and is especially prominent in the Bavarian-style wheat beers or weizen biers.

As you suggest, the yeast strain used for these beers is the necessary ingredient for the strong smell of bananas. These same strains also produce high concentrations of spicy, clovey compounds called phenols. It is the combination of the fruity esters and the spicy phenols that give weizens their distinct aroma.

Luckily, the yeast can be found in the catalogs of any number of yeast-supply companies. The descriptions to look for are words such as Bavarian weizen or German wheat beer. The most famous name in these yeast strains is Weihenstephan weizen yeast and comes from the yeast library housed at the Munich Technical University at Weihenstephan.

Many American microbrewers are making beers called hefe-weizen (unfiltered wheat beer) that are simply wheat beers fermented with the house ale strain and do not have the character you are seeking. If you culture yeast from beer bottles, don't waste time isolating yeast from these. This yeast is not the stuff you are after.

Likewise, many German wheat beers are filtered at the brewery and then re-yeasted and primed for bottle conditioning. These hefe-weizen beers have the pronounced banana and phenolic aromas, but the yeast in the bottle is very often a lager yeast. The German brewers do this because lager yeast flocculate (settle) better in the bottle and are more stable than the weizen strains.

Yeast produce the desired aroma compounds during fermentation and their concentrations are dependent on wort-specific gravity, wort aeration, pitching rate, and fermentation temperature. The easiest way to increase the concentration of aromatics is to increase the fermentation temperature. Increasing wort gravity and/or decreasing the pitching rate and/or level of aeration will also have an effect on the production of these compounds, but these variables will also influence many other qualities of the beer. Changing the temperature is the most common method to vary the pungency of the weizen aroma.

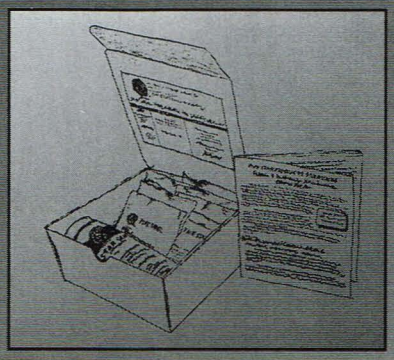
The other key factor is the use of wheat malt or wheat malt extract. Wheat not only has a different flavor than barley malt — wheat is often described as slightly sour — but it also has a higher concentration of phenolic acids. Phenolic acids are converted by certain strains of yeast, especially weizen strains, into phenols. If the wort has a low concentration of phenolic acids, then the beer will have a low concentration of the clove-like phenols.

Mr. Wizard

After brewing a recent batch, I took a sample, got an OG, and decanted the wort

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from my hydrometer flask into a small jar before I put the fermenter into my brew closet. I put an airlock on the jar and the next day I noticed it was fermenting. So, too, I assumed, was my fermenter, which I couldn't see into because it is plastic.

Is my mini-fermenter an accurate subset of my main fermenter, such that I can tell when primary fermentation is over?

Paul Fiorino
Tuscson, Ariz.

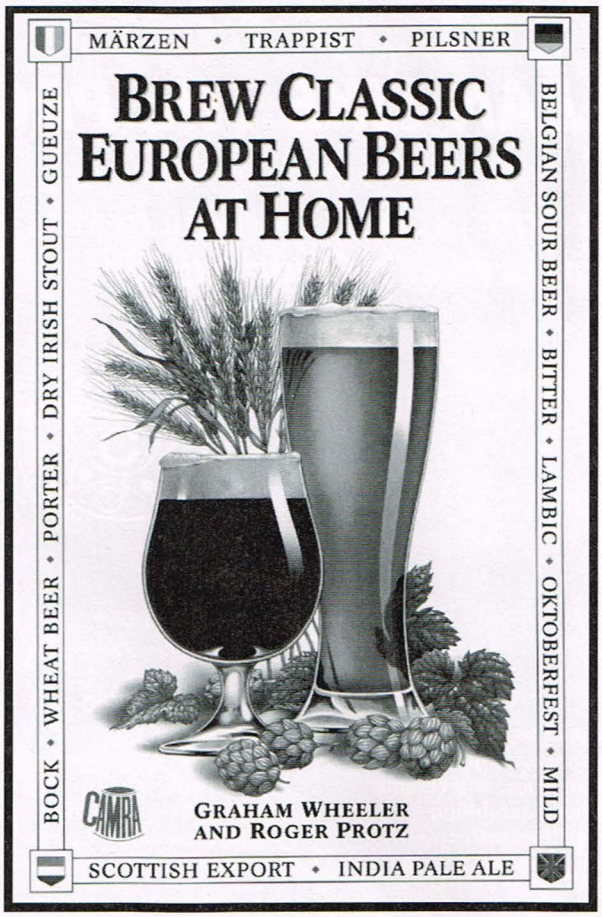
This is one of those questions that makes me excited about the invention of brewing. This practice is common in commercial breweries and the fact that this method gets "re-discovered," if there is such a thing, is a testament to its usefulness.

The method described as a micro[cosm] brew (ha ha) works well as described but is normally conducted just a little differently and is called a forced fermentation. The main difference between a forced fermentation and a fermentation carried out in a small jar is that a forced fermentation has a higher yeast density and a higher temperature and is frequently stirred to accelerate things even more.

The idea behind all of this is to zip the forced fermentation to completion faster than the normal batch of beer (made from the same wort and yeast) so that a final gravity value can be obtained for that particular combination of wort and yeast — the two factors affecting the final gravity. The reason for the higher pitching rate and stirring is not only to accelerate the fermentation but also to prevent the fermentation from hanging or failing to reach completion.

This is akin to reading the end of a novel before the bits in between. Knowing the final gravity ahead of the normal fermentation comes in handy when trying to decide whether it's time to rack the barleywine when it stops bubbling at 1.020. This might not be the highest-tech method in the world, but it works and many brewers rely on forced fermentations to predict the final gravity of their brews.

It's very important to remember that sanitation is as important here as in the normal batch, even though the beer is not mixed with the good stuff. The reason for the sanitation is that certain yeasts and bacteria are capable of over-attenuation, or giving a lower final gravity than the "normal" or uncontaminated lot. If this happens in the test batch, then results are not representative of the larger batch — unless, of course, both lots are contaminated. ■



The world is full of wonderful beer: classic beer, ales and lagers. Keen home brewers can now recreate some of the world's classics with the help of this book that has chosen the cream of international beers. In your own home, you can brew superb pale ales, milds, porters, stouts, pilsner, alt, kolsch, trappist, wheat beers, sour beers, even the astonishing fruit lambics of Belgium....and many more.

The two men behind this guide are Graham Wheeler and Roger Protz, two of Britain's foremost authorities on home brewing and editor of CAMRA's newspaper "What's Brewing". Many of the recipes in this book are once closely-guarded brewery recipes. This book is available at homebrew retail stores.

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Mr. Wizard's Address

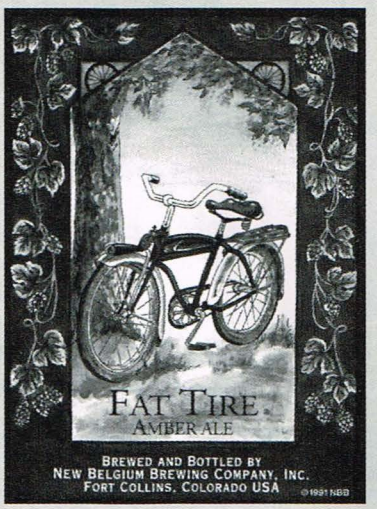
Do you have a question for Mr. Wizard? Write to him c/o *Brew Your Own*, 216 F St., #160, Davis, CA 95616. Or send e-mail to wiz@byo.com.

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

Reaping the Fruits of Brewing

New Belgium Brewing Co.

Brewer: Peter Bouckaert
Brewery: New Belgium Brewing Co., Ft. Collins, Colo.
Years of experience: Nine
Education: Degree in biochemistry in brewery and fermentation technology from CTL in Ghent, Belgium
House Beers: Fat Tire (amber ale), Sunshine Wheat, Old Cherry Ale, Abbey (Belgian double abbey style), Trippel (Belgian triple abbey style); special releases include Frambozen, Saison, Abbey Grand Cru, and Porch Swing (single abbey style)



"The most common mistakes people make when brewing fruit beer deal with microbiological problems and a lack of brightness."

Brewer: Peter Bouckaert



After harvest New Belgium's fruit is washed with chlorine-free well water, screened for color, crushed, and frozen. We don't wash it with city water. The problem you sometimes run into when using city water is the production of chloro-phenols, which are detectable by taste in very low concentrations. Homebrewers who cannot get well water can use a carbon filter.

Pasteurizing your fruit is one of the ways to reduce the microbiological load. In general when pasteurizing, be careful of the oxygen levels. You want to reduce the possibility of oxidation and the flavor it produces. Reducing the size of each piece of fruit makes the process faster and less risky.

We pasteurize the fruit for a few minutes, keeping the temperature below 158° F. But make sure the heat distribution in the whole batch is even. In general you need to pasteurize for a longer time at a lower temperature if the pieces of fruit are large.

There is a risk of contamination when brewing fruit beer. A low-risk beer would be a lambic or sour beers in general because they are already so low in pH and so well fermented. Other beers are more risky when you add fruit to them. Again, try to avoid using whole pieces of fruit and pasteurize.

My experience is mostly with sour beers. They already have a microbiological diversity and are well protected against other microbiological contamination by low pH and lack of remaining nutrients. Fruit contact time for those beers can be months to a year.

Here we keep the fruit in contact for four days for the Old Cherry Ale because that has a low fruit flavor

The Tips

- **When pasteurizing fruit, make sure the heat distribution is even.**
- **Mellow out tart fruit flavors with lactic acid or use of higher temperature in your mash.**
- **To prevent haze fom fruit, use a filter and reduce the amount of fruit you use.**
- **To prevent the flavor of seeds and pits, screen them out.**

compared with other fruit beers. Our Frambozen, on the other hand, is a very strong fruit beer, both in alcohol and fruit content. We keep the raspberries in for about two weeks.

To avoid tart or bitter flavors we make sure we have a good variety of fruit. You could use sugar to compensate for tartness, but the problem with homebrewing that way is that the sugar will be fermented again. In my experience lactic acid can mellow tart flavors. We do not add anything to sweeten the cherry beer. But we make it so that it has a high remaining extract, which gives it a kind of sweetness. It has been my winter favorite.

To develop the beer's sweetness you can also use a higher temperature in your mash, around 145° F. You can produce a certain amount of non-fermentable sugars by playing around with mash temperatures (short or no beta-amylase rest or mash in at 162° F) or you can use color malts or cara-pils.

Our raspberry is quite a heavy beer. It's the basic wort of an abbey, 6.5 percent alcohol by volume. For the United States that's quite a heavy beer. It's also quite dark. It has a high starting gravity of 16.5 Plato (1.067 specific gravity).

To prevent the flavor of seeds and pits, they can be screened out, as they are for our Frambozen; covered by remaining sweetness; or reduced by flavor compounds, such as the harshness of hops with wood.

The most common mistakes people make when brewing fruit beer have to do with microbiology and the lack of brightness. Microbiological problems very often include diacetyl off-flavors or acid formation. You can reduce this with proper pasteurization. There are also steps that can be taken to reduce microbiological problems in general. Start with good overall brewing techniques.

To prevent haze in the raspberry beer, we use different kinds of filtration. We first use a centrifuge to remove most of the larger particles. Then we send it twice through our DE (diatomaceous earth) filter. We've been searching for other methods but without positive results.

I would recommend homebrewers use less fruit to avoid haze. To compensate for flavor loss, look for a good, strong variety of fruit. ■

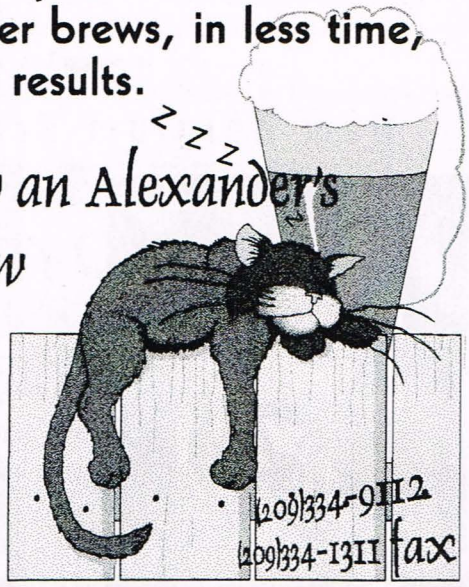
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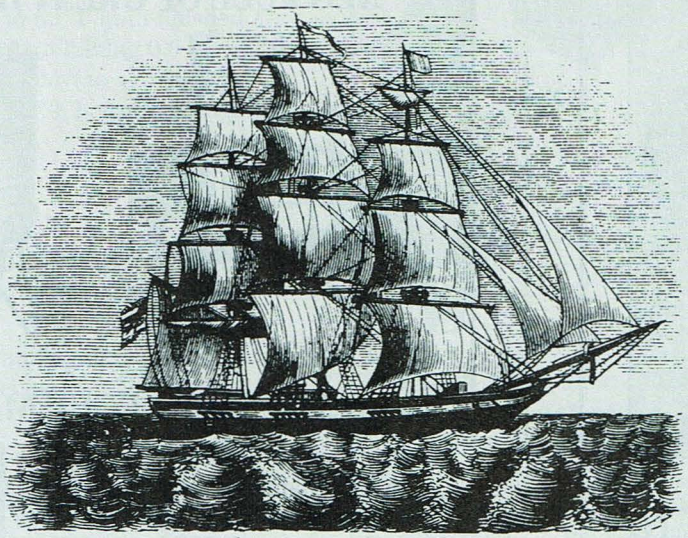
CIRCLE 68 ON READER SERVICE CARD

Traditional IPA: Others Pale in Comparison

by Alex Fodor

Would you be bitter if you had to endure a five-month ocean voyage in the dark, musty belly of a British schooner? No, you would be India pale ale. London brewer George Hodgson first brewed India pale ale, or IPA, to appease the East Indian colonies' request for a beer that could survive the long voyage unspoiled. To accomplish this he created a beer with a high starting gravity, 1.060 to 1.070, and a high hopping rate in the range of 40 to 60 IBUs. The high level of bittering compounds from the hops combined with the high alcohol level protected the beer from souring during the long journey, in which temperatures approached 85° F.

Hodgson dominated the East India market from roughly 1790 to 1820 when a number of brewers from Burton-on-Trent began to imitate Hodgson's IPA recipe and along with it his success in India.



The high-sulfate water of Burton naturally suited the high hop character of IPA, lending a clean, crisp bitterness. The strong ale remained relatively unknown in England until a ship headed for India lost its cargo near the British Isles. The casks were salvaged and auctioned off in Liverpool only to uncover a whole new market for the export beer on its home turf. Since only porters, stouts, and sweet brown ales were poured at local pubs at the time IPA, a relatively light-colored beer, was something of a novelty. Pale ale and bitter, the descendants of IPA, still dominate the British beer market, though their forefather has been somewhat forgotten.

Finding an authentic example of traditional IPA can be difficult. Most modern versions start with a lower initial gravity than traditional IPA, 1.045 to 1.060, and often finish with a higher final gravity, 1.012 to 1.018. These beers are more closely related to pale ale than its intrepid ancestor. This certainly makes a good argument for homebrewing IPA.

The original gravity of traditional IPA should fall between 1.060 and 1.070. A very attenuative yeast and a long period of warm conditioning (a month at 55° F for example) results in a dry beer with a final gravity of 1.005 to 1.012 and an alcohol content of 5 to 6 percent by weight. Originally called pale compared with porter, IPA appears as a light to pale amber color with a range of 8° to 14° Lovibond.

As much as 10 percent of the extract comes from sugar adjunct. Cane sugar or corn sugar will work well for this purpose. British pale malt contributes the bulk of the extract, composing 80 to 90 percent of the grain bill. Making up less than 10 percent of the grist, a small portion of

crystal malt adds color and flavor. Of course all good India pale ales need a hefty dose of hops. Brewers should aim for high bitterness, 40 to 60 IBUs, and strong hop flavor and aroma from late and frequent hop additions as well as dry hopping during aging. Traditionalists will choose Kent Goldings as the primary finishing hop. However, other low-alpha varieties such as Fuggles, Willamette, and Cascade will also give pleasing results.

The high sulfate content of the Burton-on-Trent water complements the high hop rate, creating a crisp bitterness unique to this brew. If your water is soft, you can add some gypsum to increase its sulfate and calcium levels to mimic Burton-on-Trent.

All-grain and partial-mash brewers can enjoy the relaxing mash schedule used by the British for this beer. A single-step infusion mash at 150° F produces a highly fermentable wort, which helps to lower the final gravity. The ale yeast should ferment dry, contributing a complex estery profile with no more than a mild buttery (diacetyl) character. Ferment the beer at 60° to 65° F and then age for a month at 50° to 55° F. Save your wood chips for cabernet. Although IPA originally traveled in oak barrels, the type of oak used imparted little wood character to the beer. The only element missing to recreate the classic beer is a five-month boat trip. I'll leave that up to you.

Burton's Best India Pale Ale
(5 gallons, all-grain)

This medium-amber IPA features the Kent Goldings hop. Its aroma is enticing. But be prepared for the puckering power behind 53.5 IBUs. If the hops don't slow you down, the alcohol eventually will.

Ingredients:

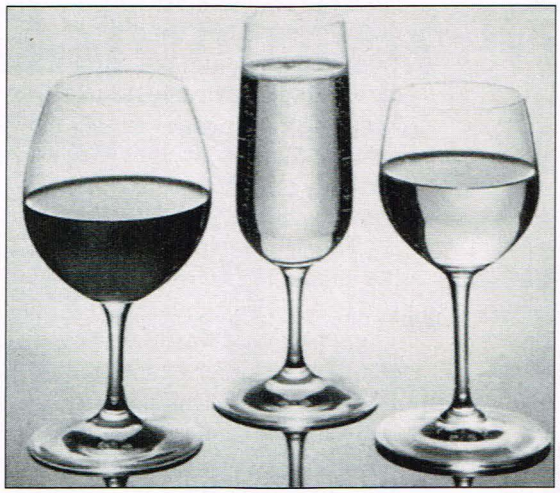
- 10.25 lbs. pale British two-row malt
- 0.5 lb. crystal malt, 40° Lovibond
- 1 lb. cane sugar, to be added at boil
- 6.8 oz. Kent Goldings (5% alpha acid): 2 oz. for 60 min., 1 oz. for 30 min., 1.3 oz. for 15 min., 1 oz. for 5 min., 1 oz. for finish, 0.5 oz. for dry hop in secondary
- Wyeast 1098 (British-style ale yeast) or Wyeast 1968 (London ESB)

Step by Step:

Mash grains at room temperature into 3.5 gal. of water at 161° F to reach a conversion temperature of 150° F for 1 hour. Sparge to collect 6 gal. of wort. As the wort approaches boil, add sugar and stir to dissolve. Boil for 30 min. before making the first hop addition. Add hops as directed at 60, 30, 15, and 5 min. before the end of the boil. A final hop addition wraps up the 90-min. boil just prior to cooling. Cool and aerate the hopped wort to 65° F and add yeast. Ferment at 60° to 65° F until finished. Rack into carboy containing 0.5 oz. of whole leaf hops. Allow to age for a month at 50° to 55° F prior to packaging.

OG = 1.066
FG = 1.007 to 1.012

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Burton's Best India Pale Ale
(5 gallons, partial mash)

Pale malt extract replaces British two-row malt and the crystal malt is increased slightly.

Ingredients:

- 4 lbs. pale British two-row malt
- 0.75 lb. crystal malt, 40° Lovibond
- 5 lbs. pale domestic malt syrup
- 1 lb. cane sugar to be added at boil
- 6.8 oz. Kent Goldings (5% alpha acid): 2 oz. for 60 min., 1 oz. for 30 min., 1.3 oz. for 15 min., 1 oz. for 5 min., 1 oz. for finish, 0.5 oz. dry hop in secondary
- British-style ale yeast

Step by step:

Mash grains at room temperature into 1.5 gal. of water at 161° F to reach a conversion temperature of 150° F for 1 hour. Sparge to collect 4 gal. of wort. Add 2 gal. of water to make a total volume of 6 gal. As the wort approaches boil, add malt syrup and sugar while stirring to dissolve. Boil for 30 min. before making the first hop addition. Add hops as directed at 60, 30, 15, and 5 min. before the end of the boil. A final hop addition wraps up the 90-min. boil just prior to cooling. Cool and aerate the hopped wort to 65° F and add yeast. Ferment at 60° to 65° F until finished. Rack into carboy containing 0.5 oz. of whole leaf hops. Allow to age for a month at 50° to 55° F before packaging.

OG = 1.066
FG = 1.007-1.012

Pride of Bombay India Pale Ale
(5 gallons, partial mash and specialty grains)

This is a simplification of the Burton's Best recipe.

Ingredients:

- 1 lb. crystal malt, 40° Lovibond
- 8 lbs. pale domestic malt syrup
- 1 lb. cane sugar to be added at boil
- 6.8 oz. Kent Golding (5% alpha acid): 1.5 oz. for 60 min., 1 oz. for 30 min., 1.3 oz. for 15 min., 1 oz. for finish, 0.5 oz. for dry hop in secondary
- British-style ale yeast

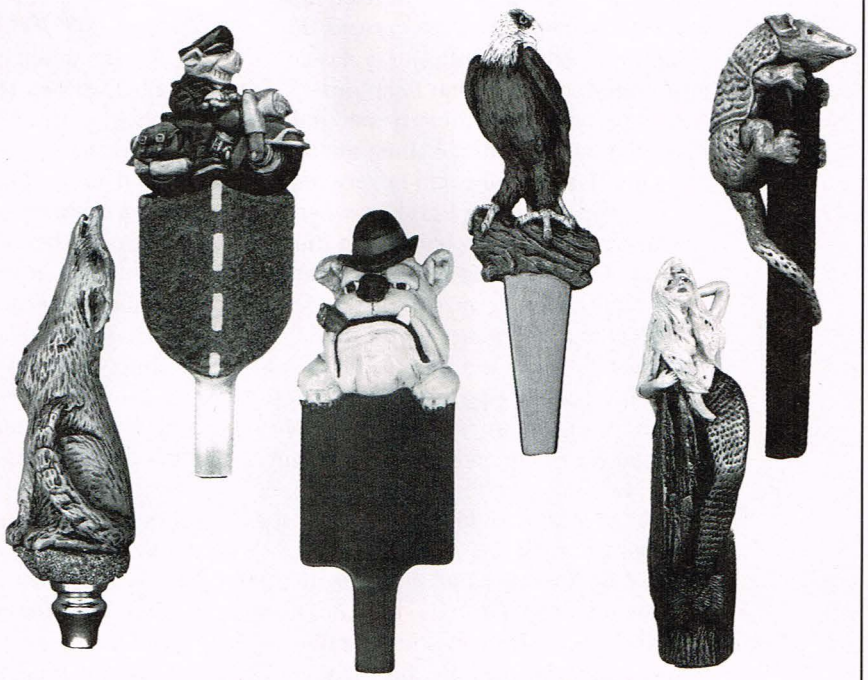
Step by step:

Immerse crushed grains in 1 gal. of water at 155° F for 30 min. Strain out grains and rinse with 2 gal. of 165° F water to make a total volume of 3 gal. As the wort approaches boil, add malt syrup and sugar while stirring to dissolve. Boil for 30 min. before making the first hop addition. Add hops as directed at 60, 30, and 15 min. before the end of the boil. A final hop addition wraps up the 90-min. boil just prior to cooling. Add about 3 gal. of cold water to cool the hot wort and bring volume to 5 gal. Once the wort has cooled to 75° F, add yeast. Ferment at 60° to 65° F until finished. Rack into carboy containing 0.5 oz. of whole leaf hops. Age two weeks to a month at 50° to 55° F before packaging.

OG = 1.066
FG = 1.007 to 1.012 ■

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Wheats of the World

While barley may reign supreme in the realm of brewing grains, wheat adds its own dimensions to beer. A handful of wheat in a pale ale style will aid head retention. Wheat used as more than half the grist creates the light and crisp qualities of a classic summer cooler. Wheat beers are trendy today, but wheat has actually been a brewing staple since the beginning of fermented grain beverages.

As one of man's first cultivated grasses, wheat may have been the catalyst of beermaking in ancient times. The Babylonians were making beer with wheat 400 years before their demise. Despite the great start, wheat has not had an easy history. The innocent grain was at one time declared illegal for the purpose of beer making. The amount of wheat needed for beer was far too great, leaving little for the making of bread.

Wheat's role as a vital ingredient of basic food has led to the ebb and flow of the grain's beer-making popularity throughout history. By the early 1800s wheat beers, as we tend to collectively call them, were nearly unheard of. The US beer renaissance has led to their revitalization. Wheat beers are back with a vengeance.

German Weisse

The traditional German wheat beer is called weisse. There are many variations within the style. The most common is the weissbier, also known as weizen. It was described in 1410 to be strong in grain, not bitter, and yellow in color.

Weizen should be decidedly fruity and phenolic in aroma and flavor. The phenolic characteristics are often described as clove or nutmeg and can be smoky or even vanilla-like. These beers are made with at least 50 percent malted wheat, and hop rates are quite low (18 IBUs and less). Carbonation levels are quite high, 1.5 times higher in carbon dioxide than the average American or German lagers. Banana-like esters are often present. A hefe-weizen bottled with yeast should have a yeast flavor.

Though wheat generally plays a large role in the makeup of weisse

By Tom Fuller


WIT BIER
WEISSE
WEIZENBIER
WEISSE
WHEATE
Rud Peen

beers, a recipe was found from the late 1400s with wheat at only 10 percent of the grist. The most important part of the weisse beer is the yeast. Without a distinct strain one cannot make a weisse. The yeast is responsible for the creation of the clove and banana esters. Attention should be paid to fermentation temperatures to keep the esters under control. The best bet here is to pitch and ferment at 64° F. Higher temperatures will create more esters and fusel alcohols. Original gravities can range from the high 40s (1.040s) to the high 50s.

The Berliner weisse is a hard-to-find style that has a sparkling character rounded by a low alcohol content and a sharp acidity. Soldiers in Napoleon's army called it the "Champagne of the north." It is the lightest (along with Kölsch) of the German styles and also a trick to make. This beer uses the combination of a yeast and a lactic-acid bacteria. The beer is very acidic and light bodied, with little hop character if any at all. Nice fruity esters round out the lactic sourness. An 1800s recipe called for wheat comprising 75 percent of the grist. Gravities run around the 30s.

The dunkel-weizen is sort of the brown ale of Germany. Its flavor profile is much like the weisse, yet it has a distinct maltiness with a roast and chocolate character. The color ranges from copper brown to dark brown. Gravities run in the 40s to 50s.

Kölsch beer is very hard to come by. It is almost pilsner-like in color with a dry palate and a medium-bitter finish. It has a nice tart, acidic quality and no fruity esters. Kölsch is a relatively modern style. It probably emergd in the 20th century. The name comes from the German pronunciation of the city name Cologne.

Recipes

To experiment with German wheat beers, use the weissbier base recipe and then add or subtract ingredients to create the other styles. For the weisse beers you will need a fitting liquid yeast strain such as those by Wyeast, Yeast Lab, or Brew-Tek.

Weissbier Base
(5 gallons, extract)

Ingredients

- 4 lbs. light malt extract
- 4 lbs. wheat malt extract
- 1.3 oz. Hallertauer hops (4% alpha acid), 1 oz. for 45 min., 0.3 oz. at end boil
- Weisse beer yeast culture
- 3/4 cup plus 2 Tbsp. corn sugar for priming

Step by Step

Add extracts to 1.5 gal. of water and bring to boil. Add 1 oz. hops and boil 45 min. Add 0.3 oz. hops at end of boil. Strain out hops, chill, and rack to fermenter. Top up to 5 gal. with chilled, pre-boiled water. Pitch yeast and ferment in the mid- to high 60° F range until done, roughly 10 days. Prime and bottle as usual.

OG = 1.055

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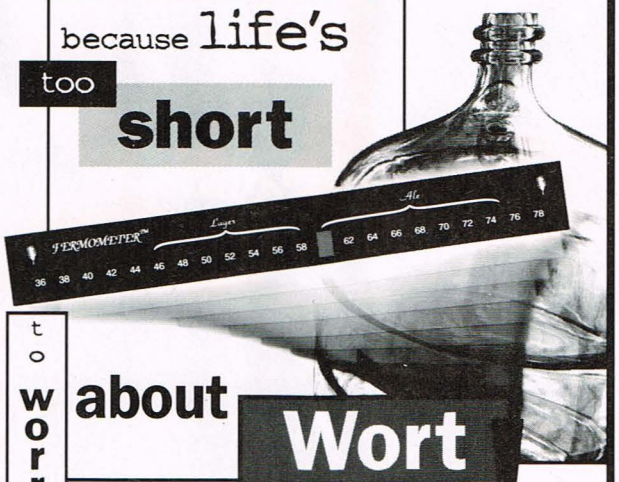
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All-Grain Weissbier

For all-grain weissbier use a single or double decoction mash for authenticity. Decoction mashes tend to better solublize starches, improve extraction, and increase color. They also break down the higher molecular proteins to make a less doughy glutinous mash, aiding in runoff and in clarification of the finished product. If authenticity is less important to you than ease of brewing, you can use a straight single-infusion mash with very good results. Even better, a slightly more time-consuming step mash achieves a proper protein rest while still being simpler than a double decoction.

If you choose to use a single infusion or step mash, pay attention to how you mix the grist in the mash tun at dough-in time. You need to thoroughly combine the wheat and barley. Remember that wheat has no outer husk and does not create a very good filter bed.

Ingredient substitutions: To make the all-grain version, replace light malt and wheat extracts with 5 lbs. pale malt and 5 lbs. wheat malt.

Infusion procedure: Dough in at 170° F with 2.5 gal. of hot liquor. Mash should stabilize at 150° to 153° F. Mash for one hour and sparge. Bring to a boil and continue with same instructions as extract recipe.

Step-mash procedure: Dough in at 142° F with 2 gal. of hot liquor. Mash should stabilize at 122° to 125° F. Stir every 5 min. or so for 30 min. Add 0.75 gal. of water at boiling temperature. Hold temperature for 30 min. Sparge with 4.5 gal. water and proceed as with extract recipe.

Dunkel

For extract dunkel use the same base recipe but steep the following grains in the water before adding extract. For an all-grain version mash these grains with the all-grain weissbier grains, which will boost the overall gravity a point or two.

- 1 oz. black malt
- 1/4 lb. chocolate malt

Kölsch

This is a light, refreshing beer. You'll love the flocculation of the yeast strain. It starts out donut-like and then turns into chunky nuggets (don't let it scare you).

Ingredients

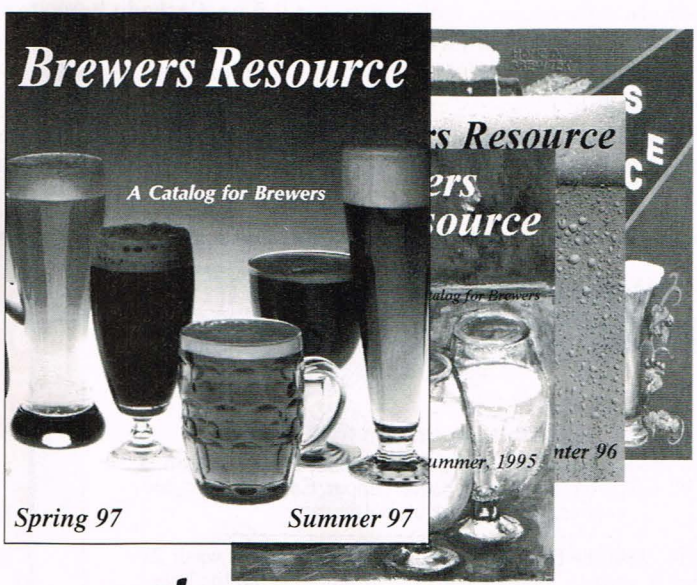
- 3.5 lbs. light dry malt extract
- 1.5 lbs. wheat extract
- 1.25 oz. Perle hops, 1.12 oz. for 45 min., 0.13 oz. at end of boil
- Wyeast 2565 (Kölsch)
- 3/4 cup plus 2 Tbsp. corn sugar for priming

Step by Step

Add extract to 1.5 gal. of water. Add 1.12 oz. Perle at beginning of boil and boil 45 min. Add 0.13 oz. hops at end of boil. Pitch yeast and ferment at 58° F for until done, roughly 8 days. Prime and bottle as usual.

OG = 1.039

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Belgian Wit

The Belgians have their own versions of wheat beer. The Belgian wit is a wheat beer somewhat similar to the Berliner-weisse style yet also unique. Pierre Celis (a Belgium native who founded Celis Brewery in Austin, Texas) and Coors with its Blue Moon have helped to resurrect this style.

Brewed with malted or unmalted wheat, wits are spiced with coriander and orange peel. These beers are typically cloudy. They are hopped with noble hop varieties to achieve a low to medium bitterness and flavor. The beer is usually quite dry with a low to medium body.

AWB
(5 gallons, all-grain)

AWB stands for Average White Beer, although it is way above average.

Ingredients

- 1.25 lbs. six-row malt
- 3.75 lbs. two-row malt
- 3 lbs. red wheat berries
- 0.25 lb. rolled oats
- 1 lb. candi sugar
- 1 oz. Hallertauer hops, 0.5 oz. for 60 min., 0.5 oz. for 30 min.
- 0.5 oz. Cascade hops, for 5 min.
- 1 Tbsp. plus 1 tsp. coriander
- 0.75 oz. orange peel
- 0.25 oz. lemon peel
- Wyeast Belgian White yeast
- 3/4 cup corn sugar for priming

Step by Step

Now first things first.

Wheat berries are unmalted wheat and should be available at your local health food store. They will have to be milled the same as the other malts, but this stuff is usually highly polished and hard as a rock.

Add wheat berries to the other grist in your mash tun and start with a temperature-controlled step mash. Normally you would have to pre-gelatinize the unmalted wheat, but since we are using a temperature-controlled step mash, this can be eliminated.

Mash in with 2 gal. of 136° F water and rest mash at 122° F for 35 min. Raise to 155° F for 20 min., then mash out at 160° F for 10 min. Sparge with 4 gal. of water at 170° F.

Boil for 15 min. and add 0.5 oz. Hallertauer. Boil 30 min. more. Add another 0.5 oz. Hallertauer and boil 15 min. more. Add 1 Tbsp. coriander and boil 10 min. more. Add 0.5 oz. Cascade and boil 5 min. more. Total boil is 75 min. At end of boil add 1 tsp. coriander,

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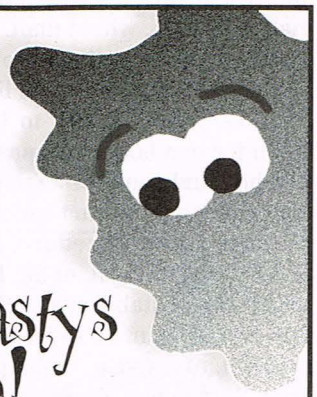
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CIRCLE 54 ON READER SERVICE CARD

the orange peel, and the lemon peel. Cool, pitch yeast, and let ferment until done at 60° to 65° F.

American Wheats

Now here is a style that really has no style of its own. American wheat beers run the gamut from pale ale with wheat in it to 60 percent wheat, 10 percent wheat, fruit, you name it. Adding wheat is just something we do.

Wheat is a good base for fruit beers, which will explain the abundance of raspberry wheat, cherry wheat, and so forth available in 22-ounce bottles all over America.

American Wheat
(5 gallons, all-grain or extract with specialty grains)

This is a recipe for a very good American-style wheat beer. It has a nice hop character and bitterness, with a citrusy and spicy quality.

Ingredients
- 5.5 lbs. pale malt
- 5 lbs. wheat malt
- 0.5 lbs. Munich malt
- 2.5 oz. caramel malt, 40° Lovibond
- 0.35 oz. Nugget hops, for 45 min.
- 0.85 oz. Cascade hops, 0.5 oz. for 45 min., 0.35 oz. at end of boil
- 0.75 oz. Hallertauer hops, for 30 min.
- 0.7 oz. Saaz hops, at end of boil
- Very fruity ale yeast (Wyeast 1968)
- 3/4 cup corn sugar for priming

Step by Step

Use a single-infusion mash at 150° F for 1 hour. Sparge with 5 gal. water and boil 45 min. Add Nugget and 0.5 oz. Cascade. Boil 15 more min. and add Hallertauer. Boil an additional 30 min. Total boil is 90 min. At end of boil add 0.35 oz. Cascade and the Saaz. Cool, pitch, and ferment at 62° F until done, roughly 8 days. Bottle or keg as usual.

For extract version use the same caramel malt steeped in the brewing water for 30 min. and add 5 lbs. light extract and 5 lbs. wheat extract.

Mulbeery
(5 gallons, all-grain or extract)

The good thing about mulberries is that they have a lot of tannins and contribute not only a nice fruit flavor but a wonderful woody flavor and aroma.

Ingredients
- 5 lbs. pale malt
- 3.5 lbs. wheat malt
- 1.5 oz. Munich malt
- 1 oz. Goldings hops, for 60 min.
- 2.5 lbs. mulberries
- Wyeast 1056 (American ale)
- 3/4 cup corn sugar for priming

Step by Step

Mash at 155° F for 1 hour. Sparge with 5 gal. water and boil. Add the hops at the beginning of the boil. Boil 60 min., then add the crushed mulberries. Allow to steep 20 min. Rack out of kettle to leave berries behind. Cool, pitch, and ferment until done at 60° to 65° F.

For extract use 4 lbs. light extract and 3.5 lbs. wheat extract.



CIRCLE 57 ON READER SERVICE CARD



CIRCLE 62 ON READER SERVICE CARD

12 Tips to Re

by Alex Fodor

1

Mashing is easy. All you do is combine water and malt. Of course you have to crush the malt first. Also, it is a good idea to check the pH. Then again you will also need to keep a close watch on temperature. In addition you may want to extrapolate the optimum ratio of your dry malt to your aqueous fraction. Logrithmically, that is. Well, everything is easy to someone somewhere.

The brewer who chooses to mash takes a road less traveled, which is not always the easiest way. Sometimes the road can be full of treachery. Alkaline water, uncrushed grains, and unconverted starch lurk around every twist in the path. But there is a beacon in the distance. It is the lucid light of sound mashing principles. Keeping in mind some important tips about mashing will give you more control over your beer and make the whole process much easier.

Water Treatment

Water chemistry can become very complicated very fast. The first few times you mash you may choose to ignore treating your water and simply treat the mash to adjust the pH into the range of 5.2 to 5.5. If you are willing to spend an extra $4 per five-gallon batch, you will be better off buying water purified by reverse osmosis. You can then add salts as you wish. If you prefer a municipal source, pay special attention to carbonate (CO_3) and bicarbonate (HCO_3) levels. High levels (HCO_3 = 150 ppm, CO_3 = 200 ppm and more) are best suited for

fine Your Mash

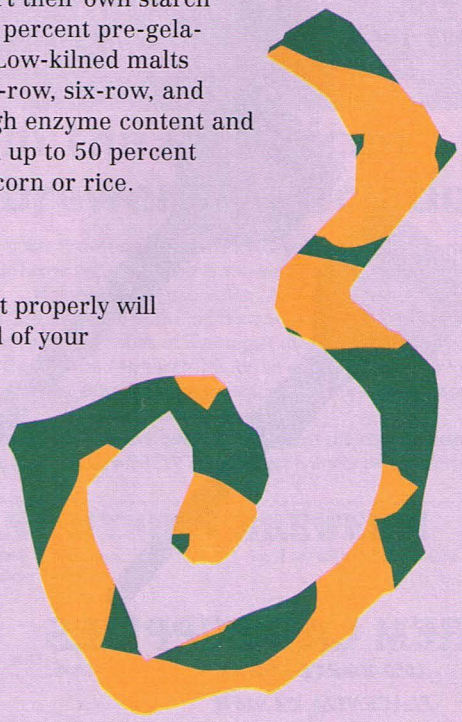
dark beers such as porters and stouts. Low levels (HCO_3 = 15 to 50 ppm, CO_3 = 100 ppm or less) suit pale beers such as pilsners. This information is included on your water report, which is available free from your water department.



Enzyme Power

Enzymes perform the magic of starch conversion. Without them the mash is nothing but a large mix of gruel better suited for breakfast than brewing. It is therefore important to make sure your recipe has enough enzyme power to convert your mash.

A range of enzymatic content measured as Diastatic Power exists for different malt types largely due to the different kiln temperatures used in their preparation. Highly kilned malts such as black patent, chocolate, and crystal malts have little or no enzymes left. Moderately kilned malts such as English pale ale malt and toasted malts such as Munich and Vienna have enough to convert their own starch and less than 10 percent pre-gelatinized adjunct. Low-kilned malts such as pale two-row, six-row, and wheat have a high enzyme content and can be used with up to 50 percent adjunct such as corn or rice.



Crush Zone

Crushing malt properly will increase the yield of your mash and help to

ensure a successful sparge. The goal of crushing grains is to make the starch and the enzymes of the malt soluble in solution so conversion can readily occur while the husk remains intact for a successful sparge. If your malt is undercrushed, an unusually high number of uncrushed kernels and large, starchy particles will be evident. If malt is overcrushed, a large amount of flour or fine particles and shredded husks will be visible. A lack of intact husk material tends to result in a poor sparge that clogs quickly and produces a cloudy run-off.

A good homebrew shop will crush your malt for you in a roller mill to a specification between the two extremes described. A mill gap between .045 and .055 inches will give the best results for most malts. Wheat malt should be crushed to a finer specification or run through twice to ensure the hard kernels are broken.

4 Mix Master

Don't forget to mix your grains in well at mash-in. When added to hot water, crushed malt tends to clump into balls. Since dumplings are not your objective, you will need to break these with a spoon. If portions of the mash are left unmixed, the enzymes and the starch will not be able to react as readily, thereby decreasing the total extract from your mash.

5 Uncoil Your Starches

Make sure your starch is gelatinized. Starch is a complex molecule made of sugars linked in a chain. These chains tend to have a stable structure that mash enzymes have a hard time attacking effectively. When the temperature of the mash rises to 147° F, the structure of the malt starch swells and the chains uncoil, making the starch susceptible to enzymatic action. The same reaction occurs when a cook adds flour or corn starch to thicken a soup.

Adjuncts have different gelatinization temperatures than malt. Brewers must therefore either purchase pre-gelatinized adjuncts or gelatinize the starch themselves. Any adjunct labeled pre-gelatinized, flaked, rolled, micronized, torrified, or refined can be added directly into the mash. Raw adjuncts can be used, but those with a high gelatinization temperature should be preboiled for 15 minutes or more to break up the starch. This is especially true for corn or rice grits and raw barley.

6 pH Principals

Track your pH. The enzymes in your mash perform best in a pH range of 5.2 to 5.5. The least expensive and easiest way to check pH is with pH indicator papers. The brewer takes a sample of the liquid portion of the mash and allows it to cool to room temperature. He then takes a reading with the paper; the color change indicates the pH. The sample is subsequently discarded. Electric pH meters also work well and are more accurate, but they cost more and require more maintenance.

If the pH is in the range of 5 to 5.6, it's okay to leave your mash alone. If, however, your pH is way off base, such as 6 or 4.5, you should attempt to adjust the pH by adding salts incrementally until the problem is remedied. Calcium carbonate ($CaCO_3$) will raise the pH. Calcium chloride (CaCl), calcium sulfate ($CaSO_4$), and lactic acid will all lower the pH.

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7 Temperature Control

Choose the conversion temperature that suits the beer style. The conversion temperature at which starch is enzymaticaly degraded to sugar is one of the most powerful tools the masher has over how the beer will taste.

Beta-amylase, the enzyme responsible for fermentable sugar, has an optimum operating temperature of 140° to 149° F. Alpha-amylase best breaks starch into unfermentable long-chain sugars called dextrins at temperatures near 158° F. The starch conversion temperature chosen may lie anywhere from 147° to 158° F, depending on the type of beer being made. By manipulating the conversion temperature you can favor either alpha- or beta-amylase, thereby altering the final gravity, the body, and the sweetness of the beer.

For a lighter beer such as a British bitter or an American lager a temperature rest at 150° F will yield a beer with a low final gravity and less body. For a medium-bodied beer such as an American amber ale or a Vienna lager a temperature rest at 153° to 155° F is more appropriate. Purposefully sweet beers with high final gravities such as a British brown ale or a Scottish ale may have starch conversions as high as 155° to 157° F.

8 Time Allowance

Time also plays a major role in the mashing process. If the mash time is too short, starch conversion may not finish and flavor may be affected. An extended starch conversion of three hours or more can result in a mash soured by lactic acid bacteria.

Generally, at lower mash temperatures

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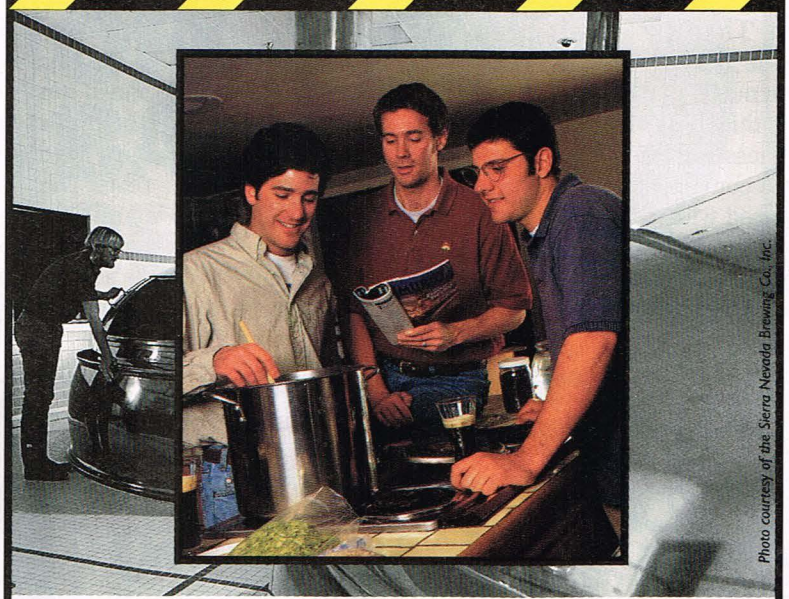


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CIRCLE 6 ON READER SERVICE CARD

9 more time should be allotted for conversion. At 149° F a temperature rest of one to 1.5 hours should ensure conversion, whereas at 155° F a rest of 30 minutes to an hour will do the job.

more diluted mash also requires a longer time for enzymes and starches to react. A water-to-malt ratio of 1.3 to 1.5 quarts per pound produces a thick mash like those used to brew traditional British ales. Enzymes are more stable in a thicker mash but are inhibited by the high sugar concentrations.

For infusion and temperature-program mashes homebrewers are best off with a thick mash. Those who practice the art of decoction will find a thinner mash helps make up for water lost to evaporation during the boiling of grain.

are picnic coolers, sleeping bags, ovens, blankets, and homemade insulated boxes. Insulating your mash tun will ensure that the temperature does not drop more than a few degrees during the conversion rest.

How Thick?

The ratio of water to grain in the mash determines the mash thickness or stiffness. Mash thickness will affect the degree of starch conversion. In a thin mash prepared with 2.5 quarts of water per pound of grain, enzymes will degrade starch more completely. Besides a larger mash tun, the

10

Insulated Tuns

An insulated mash tun steadies the mash temperature during enzyme rests. There are many ways to insulate the mash to minimize heat loss and temperature drops. Some of the more popular

Iodine Testing

11

A simple iodine test enables the brewer to call an end to the mash when it is truly finished. To perform this test draw one teaspoon from the liquid portion of the mash and pour the sample onto a white dish. Using a pharmaceutical-grade tincture of



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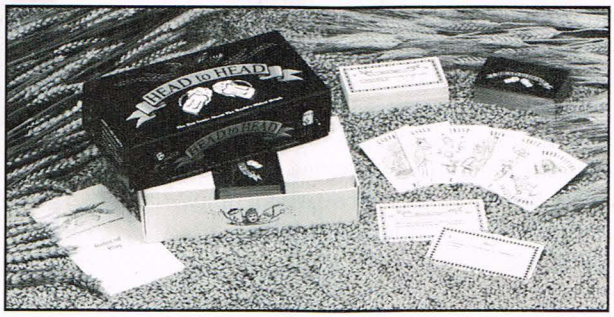
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iodine, mix one drop with your sample on the white dish. A blue-black or purple color indicates undegraded starch and an unfinished mash. A reddish color indicates a dextrinous wort, which may be desirable for certain beers. A yellow color indicates that the mash is complete and little undegraded starch remains. Be sure to discard all samples tested with iodine, because iodine is poisonous.

Efficiency Rating

Testing the efficiency of your mash tun will help you reach the desired original gravity time after time. The efficiency of your mash tun can be expressed as Points of Extraction (POE). The most extract a pale two-row malt can yield is about 36.5 POE. Roasted malt has a maximum yield of about 34 and crystal malts' maximum falls around 34.

To find out the POE for your mash tun, brew a five-gallon batch with seven pounds of your favorite pale malt and note the original gravity of the wort. The following equation allows you to calculate your POE.

$$\text{Points of extraction} = (\text{OG-1} \times 1{,}000) \times \frac{\text{gal. wort}}{\text{lbs. malt}}$$

Now plug in your results from the test brew. In this case we assume that the original gravity was 1.040.

$$\text{POE} = (1.040\text{-}1 \times 1000) \times \frac{5 \text{ gallons}}{7 \text{ pounds}} = 28.6$$

For future brews use your POE value in the following equation to calculate the pounds of malt you need to reach a desired gravity.

$$\text{Pounds of grain needed} = (\text{OG-1} \times 1000) \times \frac{\text{gal. wort}}{\text{POE}}$$

Your POE will differ for specialty grains, such as roasted and crystal malts. But when used in small amounts they should behave as pale malt and the OG will be very close to the desired value.

With a little planning mashing gives you options that extract brewing can't.

Alex Fodor is a graduate of the University of California, Davis, brewing program.

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Brewing for Special

by Sal Emma



Toasting a special occasion with an adult beverage of your choice is a time-honored tradition. Homebrewers, of course, have the advantage of toasting their special events with really special beverages — homemade ones.

But some homebrewers take it to the next level, creating special versions of their favorite homebrews expressly for an important celebration. What better way to breathe life into a party? If the brew tastes good, your skeptical guests will be amazed.

Occasions



HARVEY EISNER

It gives everyone something to talk about and something to smile about.

And if you really want to impress your guests, take the time to make a commemorative label. That's the icing on the cake and provides an instant memento of the occasion.

Tips For A Successful Celebration Brew

1. Pick an approachable recipe: This may rankle the sense of adventuresome beer selection that you have finely honed during your years as a homebrewer. But with that caveat, consider your audience.

If you're brewing for any party attended by a complement of regular folk, consider making them regular beer. That does not mean American light pilsner. Sure, make it tasty, malty, and even a bit hoppy. But if your favorite homebrew is orange-coriander-raspberry-banana-oregano-hemp-chocolate weizen, you might want to consider an alternate recipe.

Consider the ramifications of serving a beer that's above and beyond the crude tastebuds of those mere mortals who do not practice the brewer's art. At best they will really love it and praise you as a god — that's actually happened on at least one occasion. But if you brew them a concoction that makes them flee at top speed from fear, you have not done your guests of honor, yourself, or your hobby any favors. So remember the *KISS* rule. Keep It Simple!

2. Consider kegging: If you are planning to supply the beer for the party — not just brew souvenirs, it's easier to deal with double- and triple-size batches if you have made the jump to kegging your own. However, if your aim is to enhance the existing commercial selection of beers on hand, then bottling is appropriate. Of course bottling is de rigueur if you plan to make a commemorative label.

3. Make a commemorative label: Labeling your homebrew is great fun — as regular readers of the annual BYO Gonzo Label Contest know. It's especially fun for special occasions, when you can decorate a brew with photos and dates appropriate to the occasion.

Beer labels are made in nearly every computer platform available including PrintShop, Express, PageMaker, PhotoShop, even advanced word processors — you name it. But do not be discouraged if you are not a computer head. Make one nice label by hand, pasting in photos and other graphics, then have photocopies made for the commemorative brew.

You can use milk for a label adhesive if your bottles are going to stay dry at the party. Just dip the label in some milk, position it on a dry, room-temperature bottle, and smooth it down. After a few hours it will be stuck fast. However, if you plan to immerse your bottles in ice at the celebration, the water will remove the milk-glue labels. For wet environments you should use rubber cement, mounting spray, or some other glue that's not water soluble.

Also consider the type of printer

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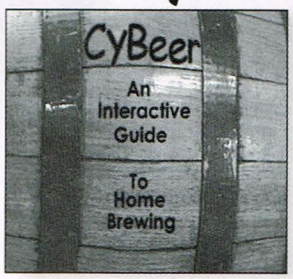
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and inks you use for labels if you plan to ice the bottles down.

You don't have to stop at labels. Beer mats are also easy to make with a simple computer program or by hand. You can also create small cards that describe the beer in terms of style and flavor as a fun way to educate your guests about what they will be drinking.

4. Plan the Presentation: Don't put bottles of beer in front of people unless you expect them to drink it. Read on.

Hot Wort

Walt Lewis of Huntington, W. Va., made a batch of beer for Father's Day 1996. It almost never made it to the bottle because while it was fermenting, his house caught fire!

"It was 4th of July and I had taken the kids to an arts-and-crafts fair about three hours from home. During the fair, I heard my name called on the PA system. When I went to investigate, the front office told me to call my neighbor, John Van Horn. I asked if there was a pay phone nearby. They said 'call from here,' not caring that it was long distance. I figured someone was dead!

"I got John's wife, Cathy, on the line. She told me not to panic, but my house was on fire. I remember her saying, 'The firemen are here. It's under control, so don't drive home like a maniac!'

"Some wiring had shorted out in the kitchen ceiling. The fire started there and crept across the kitchen, unsoldering pipes along the way. That contributed to the water damage. By the time I got home, the firemen had come and gone and neighbor John had been working like a dog getting the water out of my house and cleaning up. The damage was bad, but the good news is that nobody was hurt and we did not lose a single important or sentimental possession. Not one!"

Including the fermenting beer. Lewis was able to finish the ferment. "It started out Father's Day Pale Ale. After the fire we started calling it House Fire, Fire Brewed, True Smoked Beer — lots of puns, but we weren't really serious about naming it." Drinking it was higher on the agenda. But now they have a jump on naming the beer brewed for the fire's anniversary.

Fathers Day Pale Ale

(5 gallons, extract and grains)

Ingredients

- 8 lbs. Alexander's extra light liquid extract
- 1 lb. Laaglander extra light dry extract
- 1.5 lbs. crystal malt
- 1 oz. Fuggle hops, for 60 min.
- 4 oz. Cascade hops, 0.75 oz. for 30 min., 1.25 oz. for 15 min., 1 oz. during cooling, 1 oz. for dry hop
- Ale yeast (such as Wyeast 1056 or 1272)
- 3/4 cup corn sugar for priming

Step by Step

Wrap grains in a straining bag and steep in 160° F water for 20 min. Remove grain, add extract, and bring to a boil.

Add 1 oz. Fuggles and boil 30 min.

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Add 0.75 oz. Cascades and boil 15 min. more. Add 1.25 oz. Cascades and boil 15 min. more. Total boil is 60 min. Strain wort over 1 oz. Cascades as a "hopback." Chill and pitch yeast. Dry hop in the fermenter with 1 oz. Cascades. Bottle with corn sugar or keg.



Homebrewer John McDougall was called a god by one appreciative wedding guest responding to Caledonian Lager.

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"You made this beer? You're a god," was the comment from one guest, a college pal of the bride and groom at the wedding of Kate McDougall and Trevor Jones. Kate is the daughter of homebrewer John McDougall of Rochester, Minn. "That was the best quote I recall," says John, who was inspired to brew for Kate's special day by his other daughter.

"She went to a wedding where they served bad mead and challenged me to make some decent brew for Kate. I considered mead, since I also keep bees and they make lots of honey. But in the end I decided to do a 'Caledonian Lager' in honor of our heritage. The groom wore a kilt, by the way, and a piper from MacAlister College played for the ceremony," he says.

Kate's day was a beautiful sunny one in June. McDougall made 10 gallons of beer, enhancing a selection including commercial beer, private label cabernet sauvignon, and California chardonnay. "My beer was gone long before the other stuff. I wish I

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had made more. Even the wine drinkers were repeat samplers. It was an unqualified success and it sure made old Dad feel good," McDougall recalls.

"The groom, too, loved the beer. We approve mightily of him!" he says.

Caledonian Lager

(10 gallons, all-grain)

McDougall admits his beer is Caledonian only in name. It's more of a German-style lager.

Ingredients

- 16 lbs. Durst pilsner malt
- 2 lbs. American Vienna malt
- 5 oz. Hallertauer Hersbrucker (3.2% alpha acid), 1.5 oz. for 60 min., 1.5 oz. for 30 min., 1.5 oz. for 15 min., 0.5 oz. for 3 min.
- 6 oz. Saaz hops (3.1% alpha acid), 2.5 oz. for 60 min., 2 oz. for 15 min., 1.5 oz. for 3 min.
- Wyeast 1007

Step by Step

Mash at 130° F for 30 min., then raise to 156° F via decoction. Sparge to collect 12 gal. and bring to a boil. Add 1.5 oz. Hallertauer Hersbrucker and 2.5 oz. Saaz hops. Boil for 30 min. Add 1.5 oz. Hersbrucker and boil another 15 min. Add 1.5 oz. Hersbrucker and 2 oz. Saaz hops and boil for 12 min. Add another 0.5 oz. Hersbrucker and 1.5 oz. Saaz and boil 3 min. more. Total boil is 60 min. Cool and pitch yeast.

Ferment at 55° F. Gradually lower temperature in secondary to 34° F over five weeks. Prime and bottle or keg according to your usual technique.



Wedding Wheat

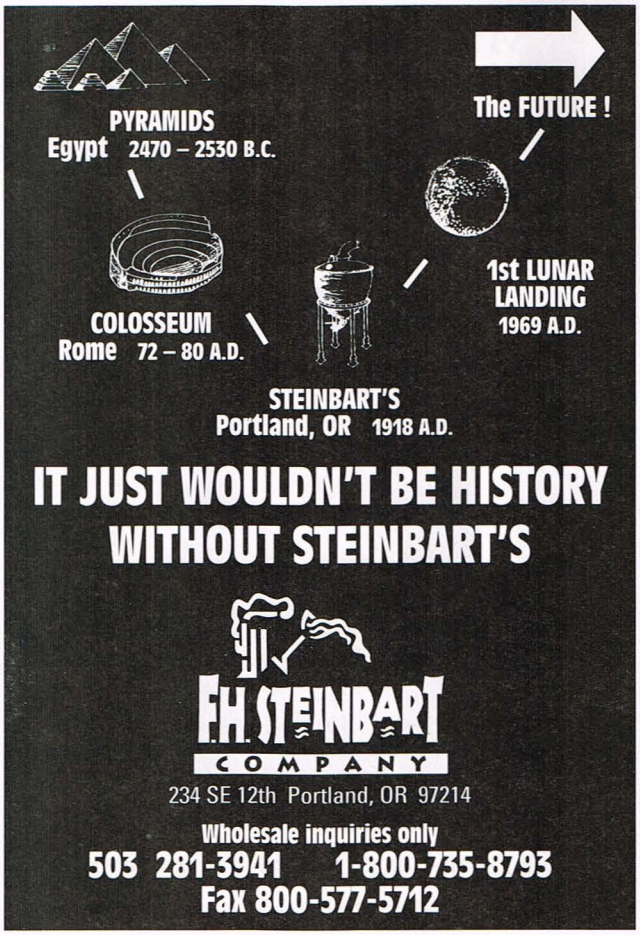
Ron Wrucke of Middletown, N.J., brewed up a batch of wheat beer for the wedding of his youngest daughter, Stacy.

"The wedding was, from my perspective, a monster. Big, lots of invitations, young partying crowd. Of course we invited some old people, but the partying adjective still applied," says Wrucke.

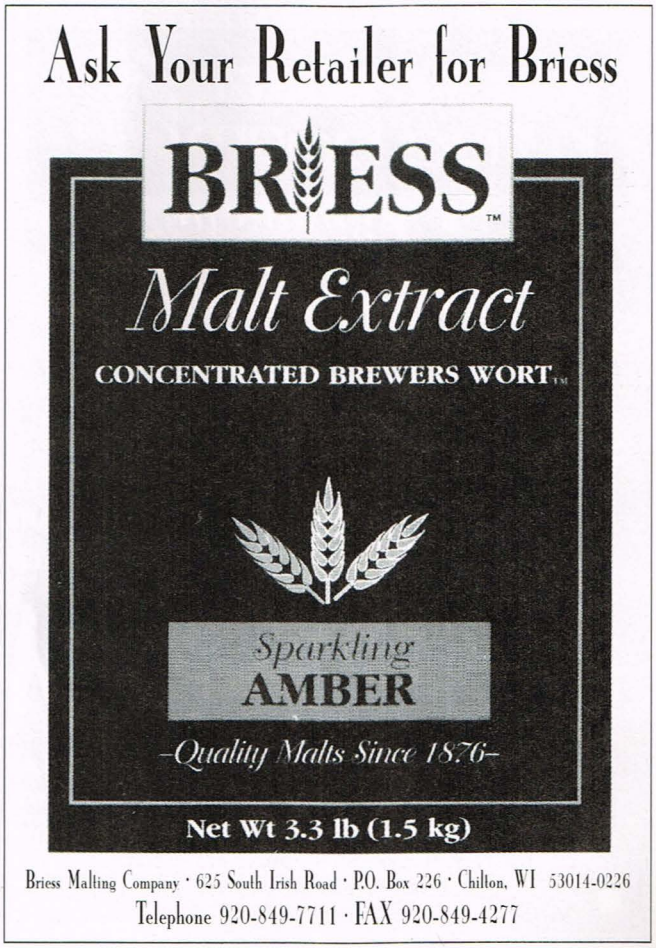
He made a batch of American Wheat. "I wanted something fairly light — dark brews seem to intimidate the 'Silver Bullet' crowd — yet a little different than the norm. I used regular ale yeast for a regular beer taste without cloves or bananas. I also kept the bittering level pretty low, in the mid-20s. To me it was a little bland, but it was a good choice considering the target audience."

To ensure it was well conditioned in time for the wedding, Wrucke allowed eight weeks in the bottle. "It was pretty clear, for a wheat, and poured up with a nice head. In retrospect it was an excellent brew," he says.

Wrucke learned an important



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CIRCLE 21 ON READER SERVICE CARD

lesson in special-event brewing: Don't put beer in front of people unless you want them to drink it. Afraid the beer would be less than a hit, he envisioned having stacks of it left over after the wedding. He tried to give away the first round as party favors at the Friday night groom's dinner. His plan was for folks to take it home, chill it, and enjoy it at their convenience.

"I stood up to tell them about homebrew, how to pour it to avoid sediment, use a glass, don't pour it all.

"Next thing I know, someone pulled out a Swiss army knife, popped the top, and took a big swig from the bottle. He pronounced 'Hey, this is great stuff,'" Wrucke laughs. With that went his well-laid party-favor plans. "I don't think any of those bottles left the restaurant with their tops on. And the brew wasn't even cold!"

Wrucke served the rest of the beer — properly chilled — at the post-reception party, held in a hotel room. "They must have liked it because by the end of the night, it was all gone," he says.

On Sunday Wrucke and his wife got their first chance to relax. "There was one beer left, in my kitchen fridge. I made motions toward it and my wife said, 'Don't you dare drink that. I'm saving it.' It's still sitting in the fridge. One of these days I'm going to drink it, fill the bottle with water, and recap it!" Wrucke says.

Wedding Wheat

(5 gallons, extract and wheat)

Ingredients

- 9 oz. crushed malted wheat
- 6.6 lbs. Muntons Wheat Extract
- 2 oz. Hallertauer hop pellets (3.1% alpha acid), for 60 min.
- 1 oz. Tettnanger hop pellets (3.1% alpha acid), for 15 min.
- 1 oz. Fuggle hop pellets, for 1 min.
- 1 Tbsp. Irish moss, for 15 min.
- 2 packages Muntons dry yeast
- 7/8 cup corn sugar for priming

Step by Step

Wrap the crushed wheat and steep in 2.5 gals. water at 160° F for 30 min. Remove grains, add extract, and bring to a boil. Add Hallertauer hops and boil 45 min. Add Tettnanger hops and Irish moss and boil 14 min. Add Fuggle hops and boil 1 min. more. Total boil is 60 min. Chill and pitch yeast. Bottle with corn sugar.

Beer College

Father and son brewers Bill and Bryan Raughley of Fairfax County, Va., brewed a batch of ale when Bill's second son, Chris, graduated from Virginia Tech.

"It was actually Dad's idea, but I agreed immediately and we went to work," Bryan says. They made a batch of their ESB but toned down the hops a bit. "We did this for Chris' sake. He does not like hoppy beer. He's more of a raspberry wheat kind of guy, so we tweaked our recipe to his liking.

"The cool thing about making beer for a special event is that it introduces

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the idea of homebrewing to people who may not have ever heard about it otherwise. Some of the people who tried Chris' beer were amazed that beer could be made at home. People who never gave it any thought never realized how much effort goes in to even the average can of beer. And they liked it!"

Bryan says his brother enjoyed the whole experience. "Chris really appreciated that Dad and I took the time and effort to make him a batch of brew. A custom beer — sporting Chris' mugshot on the bottles — really let him know that he was the center of attention for the day."

Professor Raughley's Brain Beer
(5 gallons, extract and grains)

Ingredients

- 3.3 lbs. Muntons light malt extract
- 3.3 lbs. Muntons amber malt extract
- 8 oz. crushed crystal malt
- 1 oz. chocolate malt, cracked and roasted until aromatic
- 0.5 oz. Fuggle hop pellets, for 60 min.
- 1 oz. Northern brewer pellets, 0.5 oz. for 60 min., 0.5 oz. for 15 min.
- 1 tsp. Irish moss, for 15 min.
- Muntons Dry Ale Yeast
- 3/4 cup corn sugar for priming

Step by Step

Tie grains in a straining bag and steep in your brewpot in 160° F water for 20 min. Remove grains, add extracts, and bring to a boil. Add the Fuggles and 0.5 oz. Northern Brewer. Boil 45 min. Add another 0.5 oz. Northern Brewer and Irish moss. Boil 15 min. more. Total boil is 60 min. Chill to 50° to 60° F, pitch, and ferment. Bottle after fermentation is complete, using corn sugar to prime.

Fish Tales

Bill Vannerson of McHenry, Ill., is not just a homebrewer but a lover of tropical fish.This past Memorial Day, Vannerson went to a tropical fish convention in St. Louis hosted by the AKA, the American Killifish Association.

"Killifish are colorful little fish that are rarely seen in pet stores. They are distributed among hobbyists by people who collect them in the wild, sometimes in remote jungles and savannas.

"Most collectors trade fish for fish. But when I wanted to get started with killifish, I had none to trade, so I made a deal to trade some fish for some homebrew, Bombay Billy's India Pale Ale," says Vannerson.

"The person with whom I had arranged the trade is from Syracuse. He ended up sharing my beer with other members of his local killifish club, the Upper New York Killifish Association (UNYKA). They were ecstatic!

"As it turns out, UNYKA is hosting the 1998 convention and I have been designated KilliCon 1998's official brewmaster! I am going to make Aphyosemion Ale, which means nothing to most people, but to killie keepers it's a clever name based on the genus of one popular variety of killies," says Vannerson.

Another event made more successful by some special beer, no doubt.

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Malt Madness III: THE

by Randy Whisler

The array of non-malted adjuncts is almost as amazing as the number of specialty malts available. Basically, any grain can be used, to some degree, in brewing. The most used adjuncts are wheat, corn (maize), rice, oats, rye, sorghum, and potatoes (yes, potatoes).

In most cases these adjuncts will require mashing; they all contain starch, which is unusable to yeast. If the yeast don't get fed, they do not create beer. Therefore, the starch must be converted into fermentable sugar through mashing. If you do not create beers from a full mash but want to play around with some of these adjuncts, you can use enzymatically active malt syrup. This will allow you to mash some of these adjuncts with minimum inconvenience.

WONDERFUL WHEAT

Unlike other adjuncts wheat is frequently malted. Malted wheat is quite active enzymatically — it actually has more beta-amylase activity than most malted barley. This makes malted wheat a good choice for highly fermentable beers. By using a liberal amount of malted wheat (20 to 50 percent of the grist) in a low-temperature infusion mash (148° to 152° F), you will be able to break down most of the starch into fermentable sugar and leave very little dextrin behind. Hence, you will have a beer that has less mouthfeel and less body but more alcohol compared with a beer made from the same weight of all-barley malt product. In other words it creates a good summertime beer. Frequently people refer to these beers as "dry beers."



Unmalted wheat is also commonly used. While this adjunct lacks the enzymatic power of malted wheat or barley, it does supply a clean source of starch and is cheaper than malted barley. Unmalted wheat can be used in relatively high amounts, up to 50 percent of the grain bill. If you use a high percentage of unmalted wheat, you should give a protein rest during the mash and also use a temperature-program mash.

A suitable mash would be something around 125° F for 15 minutes, 148° F for 20 minutes, 157° F for 20 minutes, then lauter without raising the temperature again. This style of mashing will help break down the protein in the wheat (wheat usually has a bit more protein than barley — see Grain Facts chart, page 48) and allows the beta-amylase to work a bit longer than normal. By not heating to 170° F at the end of the mash, you allow the alpha-amylase to continue working until the lauter runoff reaches about 170° F. This again will create a dry style of beer.

The wheat itself



TODD HAMMOND PHOTOS

ADJUNCTS

This is the third article of a comprehensive three-part series on brewing with specialty grains.

also imparts a different flavor to the finished beer. Wheat, unmalted or malted, seems to give beers a bit more thirst-quenching quality, kind of a dry, lingering flavor. Some people absolutely love this flavor while others find that wheat beers are not their cup of tea, so to speak.

One of the drawbacks of this adjunct is that wheat does not come with a husk. Lack of a husk will cause your grain filter bed to be substantially smaller. Generally, with a thinner filter bed the lauter will go faster. However, wheat mashes are notorious for sticking. Wheat's beta-glucans (gums) increase viscosity (resistence to flow). Again, the low temperature at the start of the mash will help to degrade the beta-glucans and thus help lower the viscosity.

When using wheat, you are also likely to end up with a cloudy product. A cloudy product is only a problem if you do not like cloudy beer. Wheat beers are expected to be cloudy. Some brewers claim that you can make crystal-clear wheat beer by using rice hulls as a filter bed. This is a reasonable idea. If you are interested in a clear wheat beer, try adding about six to 12 cups of rice hulls into the lauter (after adding foundation water) and then lauter as normal.

In addition to unmalted and malted wheat, you can use flaked wheat. The advantage of flaked wheat is that it has



already been gelatinized. The process of flaking grains is performed by wetting the grain, then sending it through very tight rollers that are heated. Heat is also generated from the pressure on the grain as it passes through the rollers. The heat gelatinizes the starch, then the grain is dried again and you have rolled or flaked material.

(POP) CORN?

Corn is basically a mutant grass that produces large grain heads with large kernels. The over-sized heads and kernels are good for farmers because they can make more tons of food on the same acre, which makes it cheap for the brewer (at least cheaper than malted barley). Aside from the cost benefit, corn is actually a great adjunct to lighten beers (yes, it is true not all beers have to be highly hopped, IPA-style beers with amber color and a starting gravity of 1.070).

Corn supplies no enzymes to the mash. Therefore, you should use a highly enzymatic malt (such as regular pale six-row American malt) if you are planning to use corn as more than 30 percent of the grist. Also, corn as more than 40 percent of a grist can produce off-flavors. Corn contains a bit more oil than does barley, and it contains more nitrogenous compounds other than protein. The protein level is about the same as barley.

There are several ways to use corn as an adjunct. You can use corn in the form of flour, grits, and even corn meal. If you are using the flour, use it as less than 15 percent of the total grain bill. Flour should technically dissolve completely. However, flour and homebrewing frequently lead to a watery phenomenon sometimes called Lake Lauter Tun (stuck sparge).

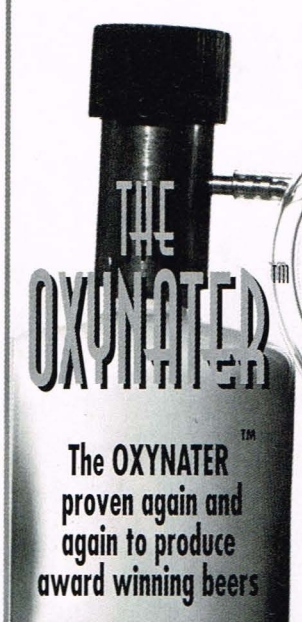


Grits are fine to use but they must be boiled or at least heated in water to 190° F to fully gelatinize. This is also the case with corn meal.

To use the grits or meal, the brewer must be competent in mashing. You will have to mix a barley mash at a low temperature into a corn mush at a high temperature and have the two mixtures balance between 149° and 158° F.

To avoid mash problems you can use torrified corn (a fancy name for popcorn). This might seem strange at first, but it is an easy way for a homebrewer to get gelatinized corn without a big hassle. The gelatinization occurs when the kernel of corn is heated to the point where the steam vapor inside the kernel violently ruptures the kernel wall. The corn at this point is well above gelatinization temperature, and the steam pressure acts like expanding foam and pushes the inside of the

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kernel all higgly-piggly, and you then have gelatinized corn (and a great snack for the movies).

There are a few things you should know before you use popcorn as an adjunct:

1. You cannot use oil to pop the corn. Instead use an air popper or the microwave; the oil will ruin the beer.

2. Keep in mind a pound of unpopped popcorn will make a huge volume of popped popcorn. It can take a while to get all of the popcorn into the mash. Crushing the popcorn will help speed up the process.

3. Use fresh popcorn, made right before the mash is started. Popcorn left overnight will become stale.

As far as adjuncts go, popcorn is a great choice. It is particularly useful for lightening up those quick-drinking, light summer brews. Also, you then get to use neat new phrases such as "hey, you guys want some liquid popcorn?" Let your friends chew on that one for awhile.

RICE IS NICE

Rice is another very good adjunct. It imparts very little flavor to the beer and is primarily used to lighten the color and flavor of beers. Rice can be used in amounts as high as 60 percent of the grist under controlled conditions. Rice has a very high starch content, usually in excess of 80 percent. Again, highly enzymatic malt should be used in these instances. Rice has less protein than barley. Since the protein level is a bit low, a protein rest should be used to ensure that the yeast will receive enough amino acids to remain healthy and ferment properly.



The main way to introduce rice into a mash is to make a wet rice mixture (three parts water to one part rice by volume) then boil the mixture, taking care not to scorch the rice. This mixture can then be added to the mash. For the protein rest you can add the boiling rice mixture to a mash that is made with room-temperature water. This will bring the temperature of the mixture between 90° and 130° F depending on the amount of rice used. Let this mixture set for 15 to 20 minutes, then heat the mash to your desired mash temperature either by adding boiling water or by turning on the mash heater (stove).

As with corn, you can use torrified rice. This product can be purchased at most food stores. It would not seem unreasonable to use all-natural rice cakes in a brew. Experiment with this adjunct. Making a good light beer is a sure test of your brewing ability.



CIRCLE 51 ON READER SERVICE CARD



CIRCLE 22 ON READER SERVICE CARD

SOWING OATS

Oats have long been used in the making of oatmeal stouts. Generally, the oats used are flaked or rolled.

Oats are one of the adjuncts that should not be used in large quantities. It is good advice to stay under 15 percent of the grain bill with this adjunct. Oats have a high cellulose content. This makes the lauter runoff more difficult. They also have a high fat content compared with other grains. This can lead to off-flavors and oxidation down the road. The protein content is somewhat higher than that of barley. Finally, the starch content is quite a bit lower. With all that in mind, this is not a filler adjunct.

This adjunct is used to alter the flavor profile of a beer. The flavor of the oats has been described as both sweet and dry. Many brewers believe that oats add a smoothing flavor to stouts, something along the lines of what raw sugar does to espresso.

Experiment with this grain; use it in your darker beers. See if you like it. You can also use it to make multi-grain beers. These types of beers are coming into vogue at the moment. Be the first person in your club to make a seven-grain liquid bread.

Grain Facts

Grain	Starch %	Oil %	Protein %
Wheat	74-78	1.5-2.5	13-16
Corn	68-74	5.6-6.0	11-12
Rice	79-82	0.4-0.6	8-10
Oats	60-63	6.0-6.2	13-14
Rye	72-76	1.8-2.2	13-14
Sorghum	69-71	2.7-3.2	10-12
Potato	78-80	—	—
Acorns	72-80	2.0-5.0	11-14

A RYE WIT?

Rye is one of the new grains that is coming out in commercial production. Actually it is not new; it is just being reintroduced to brewing. It has a distinct flavor that some brewers find more appealing (less dry) than wheat. Rye makes wonderful drink-on-a-hot-day beers.

The grain itself has a bit higher percentage of starch than does barley. It also has a higher protein content but not as high as wheat. It is low in fat material. Overall rye lends itself well to brewing. When mashing, treat this as you would the rice and pre-cook the

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ground rye. Do not add more than 40 percent rye to a brew.

CHEW ON SORGHUM

Sorghum has not been used much in the past but continues to pique the interest of commercial brewers. It has the potential to be very cheap and useful. There are conflicting reports on how much oil an average sorghum seed contains. Some reports say the oil content is excessive. Some indicate it is similar to that of barley. It is very likely that different strains of sorghum have different oil contents. Sorghum may also be very astringent if not de-hulled.

In any event it is still worth giving this grain a try. Use the freshest grain you can get and mill it just before you use it. This will help keep the oxidation of the oils down. Sorghum is reported to have a fairly high gelatinization temperature. Therefore, boil this grain then decoct it into the colder barley mash (the same procedure used for rice and rye).

YOU SAY POTATO

Here is an adjunct that is often overlooked yet is one of the cheapest and easiest-to-prepare starch sources around. You have to cook the potato before use, even though a tater's gelatinization temperature is low enough that it does not require pregelatinization. An uncooked potato is hard to grind up. If you microwave the potato for three to seven minutes, depending on the size of the tuber, you will have a nice, pliable, easy-to-mush-up starch. A more important reason for cooking the Idaho rock is that these little starch bombs have an enzyme in them called polyphenol oxidase. The polyphenol oxidase is responsible for the change in color when you cut into an uncooked potato and leave it for any amount of time. The potato turns either a reddish color or a brown-purple color. The red color might enhance the beer, but the purple color would likely not enhance the aesthetic qualities of the beer.



Again this is an adjunct that will lighten the color of a beer, provided the spud is cooked before mashing. If you use this adjunct in quantities of 20 percent or less, the only problem seems to be that most people find the idea of drinking potato beer objectionable. Just in case, don't tell your friends about your secret ingredient until they have tried a few of these beers.

BARLEY, IT'S SMOKIN'

While smoked barley is a malted product, it frequently gets left out of specialty-malt discussions. There are several types of smoked malt, just as there are several types of wood used to smoke other foods. You can have hickory smoked barley, also mesquite, oak, maple, and so forth. Then there are the non-woody smokes

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such as peat. All the smokes impart a slightly different aroma. With the exception of the peated malts, they impart a dramatically different flavor. Use smoked malt sparingly at the start. It can produce a potent aroma and flavor.

ACORNS

Acorns were used as a staple food source by most of the American Indian tribes and are a traditional food stuff in Korea, where active food science research is conducted on how to best use acorn starch.

The acorn is cheap and easy to obtain in the wild during fall, and it can be purchased, already processed, in many Asian food stores. If you buy the processed acorns, you do not have to worry about eliminating their tannins (astringent compounds).



If you decide to collect the acorns, you should invest some time in cleaning them properly. When collecting, take only the freshly fallen green ones or pick them off the tree. Put them in a dehumidifier or heat them in the oven for about two hours at 200° F. This will dry them and also kill any worms living in them.

Once the acorns are dried, get rid of the shell and then coarsely grind the acorns. To remove tannins put the crushed acorns into a leg of a nylon stocking and run water through the mush for about two hours. The flow rate does not have to be high but should be continuous. After this the acorn mush can either be mashed with the method used for rice or dried to use at a later date.

The acorn itself is very similar in content to barley. It is 72 to 80 percent starch, 8 to 12 percent protein, and has a low oil content. One of its major drawbacks is that, like the potato, it contains high concentrations of the enzyme polyphenol oxidase. Therefore, the beers made with acorns will not be of the lighter variety. In test mashes the color comes out to be a brown shade along the line of a Vienna or Oktoberfest-style beer. This is a good adjunct with which to make your Thanksgiving and Christmas beers.

Most any grain can be used as an adjunct, and this is not an all-inclusive list. Experiment with anything you find — any clean starch source can be used. Be creative. If the beer does not turn out the way you would have liked, write it off to experience and try another adjunct. Bird seed beer, hold the sunflower seeds?

Randy Whisler is a Brewer at Smutty Nose Brewery in Portsmouth, N.H. He holds an MS in brewing from the Foods Science Department of the University of California at Davis.

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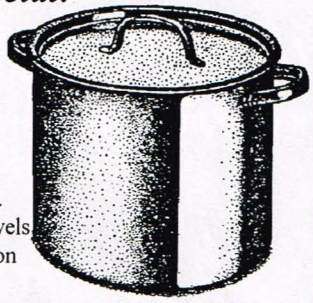
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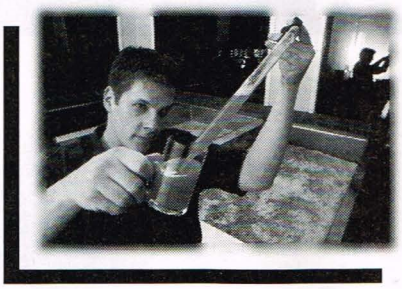
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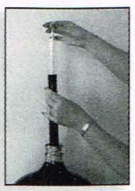
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Creating New Hop Varieties

by Ralph Olson

Ever wondered where your hops come from? You might know where they are grown, but what do you know about their origin? Many varieties used today were invented to enhance the best traits of several breeds.

Suppose you're tasting your latest beer and you decide the hop nose you gave it is wrong. Not too spicy, exactly. Not too grassy. Not floral, either. That's not it.

You want a hop that has a flavor that's different than anything on the market, maybe between Cascade and Centennial or between Mt. Hood and Columbus. New hops are developed regularly. Can someone create one to satisfy your need?

In fact many of the hop varieties that are considered standards in the brewing industry today are relatively recent inventions. Mt. Hood made its commercial debut in 1990. Liberty first appeared on the market in 1991. And if you've ever wondered why none of the brews you drank when you first came of age had that trademark Cascade flavor, its because Cascade hops barely existed. They hit the commercial market in 1972, but at that time more than 80 percent of the hops planted in the United States were Cluster, and Cluster continued to dominate until the mid-1980s. A brewer who didn't use Cluster used an established import such as Fuggle, first grown by the British in the 1860s, or Brewer's Gold, which first appeared in 1919.



So who decides what hop varieties make it to market? And who decides what the goals are when the horticulturists start experimenting?

Well, if you want to have a say in the process, it helps if you work for a big brewery. Much of the funding for public hop-breeding programs comes from an organization called the Hop Research Council. It consists of six very large brewing companies: Anheuser-Busch, Adolph Coors, The Stroh Brewery Co., Suntory (Japan), Heineken (The Netherlands), and Labatt (Canada).

Virtually all the US hop dealers belong to this organization, and the growers are represented through their state commissions. The HRC directs how money is to be spent among the researchers.

The only public breeding programs in the United States are located in Corvallis, Ore., and Prosser, Wash. These public programs, which receive state and federal funding in addition to money from the HRC, have most recently been involved with finding new aroma hops but in the past were responsible for many of the high- or super-alpha hops available today. Hops that are released from the public programs can be used by any hop grower.

There are also some private breeding programs operated by hop dealers. These top-secret programs develop hops that are patented and only grown and sold at the direction of the dealer who bred them.

So will anyone be producing your ideal hop? Only if it passes muster in the intense world of hop breeding



A hop faces many obstacles before making it through a breeding program. Shattered cones or those that stick to the vine are lost in the picking process.

where at most one in 10,000 hop varieties makes it into a glass.

Beneficent Mutation

New hop varieties are bred to accentuate a positive trait (increase alpha acid, for example) or decrease a negative trait (such as the hop's susceptibility to a particular disease). In nature hops reproduce either by pollination of the female, which develops a seed, or by the roots (rhizomes) forming runners that spread out and emerge from the ground creating new plants away from the main plant.

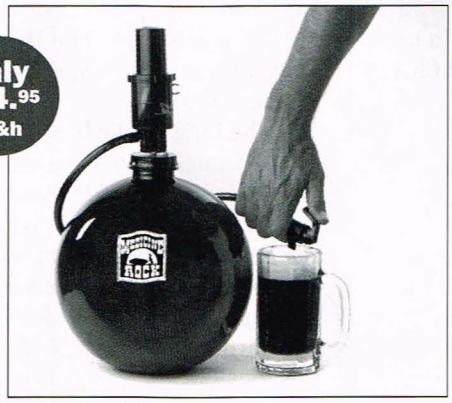
In a typical commercial hop field, only female hops of one variety are grown. The female develops the hop cone that we have come to know and love in brewing. This cone can possess up to 10,000 lupulin glands, which contain the hop resins and oil profile used in the brewing process. The male flower, on the other hand, only produces 10 to 25 such glands and so is useless for brewing purposes.

Because of this controlled planting, you can't expect random acts of inter-variety breeding to create the next big Cluster or Cascade. New varieties are produced in three basic ways. The first is by mutation or by natural selection. Beneficial mutation doesn't happen very often, but some famous hops have been discovered this way, such as the variety Bates, a type of Cluster.

Mass Selection

The second method of producing a new variety is by mass selection. In this process you would cross many plants, either in a controlled or uncontrolled fashion. Controlled means you know both parents. Uncontrolled means you don't; you just cross plants, test the results, and cross your fingers. Examples of hops coming from a controlled program are Nugget, Olympic, Chinook, Centennial, and Cascade. Some uncontrolled offspring are Eroica and Galena.

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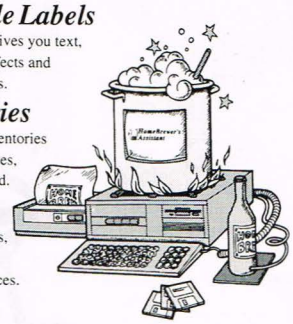
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While it may sound easy, it is actually very difficult to get new, commercially viable varieties through mass selection. At Hopunion USA, a private grower and hop dealer, more than 10,000 cultivars were crossed a few years ago, but only one (Columbus) has made it all the way through the program. To date only a half dozen are still being evaluated for their characteristics. The remaining crosses show some promise. The other 9,900-odd crosses were destroyed.

Just because two types of hops were crossed, that doesn't mean the resulting plant will have the characteristics of the parents. Chinook is a good example of a crossed hop that differs from its parents. Chinook's parents are Petham Golding and Brewer's Gold. You might consider using Chinook in place of Brewer's Gold for bittering but would not substitute it for the Golding as a finishing hop. On the other hand Chinook is a popular hop both for bittering and finishing in its own right.

Brewer's Gold and Bullion are products of the first formal mass-selection breeding program. The program's goal was high alpha-resin content and eventually tests also produced Northern Brewer. High alpha-resin hops grown today are descendants of this original program.

Chemical Inducement

The third way to breed hops is by chemical inducement. Most hops are called diploids because they have two sets of chromosomes. A chemical is used to create a tetraploid hop, one with four sets of chromosomes. Then the tetraploid is crossed with a diploid to create the final product, a triploid hop. The goal of a commercially grown triploid hop is to create a female who acts like she is pollinated (and develops a bigger cone to house the seeds, thereby giving bigger yields) but is in fact sterile. The result is bigger yields without all the seeds of pollinated hops. The seeds are undesirable because they lower the harvested hop's value.

The Willamette variety is a triploid version of Fuggle. Mt. Hood, Crystal, Ultra, and Liberty are triploid Hallertauer varieties. A few commercial triploids have occurred in nature, such as Hueller and Record.

Making the Hop Grade

There are many reasons that hops don't make the grade in a breeding program. In the United States breeders are primarily looking at yield and resistance to diseases, mainly downy mildew. If the yield is too low, then the cost of growing the variety may be too great. Yield may also be subject to great variations from year to year, thus making it difficult to ensure a normal flow of supply to the brewer.

While downy mildew is the main disease that the US breeder initially looks for, other diseases and pests can eventually play an important role in a new variety's future or demise. A few years ago Hopunion had a variety called CFJ4 that was an instant favorite with many of the craft brewers. Unfortunately CFJ4 wasn't resistant to mosaic virus and had to be

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irradicated after a few years. Breeders don't test for resistance to this virus.

This year US hop growers had their first official outbreak of powdery mildew, which has damaged portions of the crop. Certain hop varieties appear to be more susceptible to this disease than others. Because the US breeding program has never taken powdery mildew into consideration, no one really knows which varieties are immune or not and if so to what degree. This disease will most likely be here to stay, so in the future hops will be tested for it.

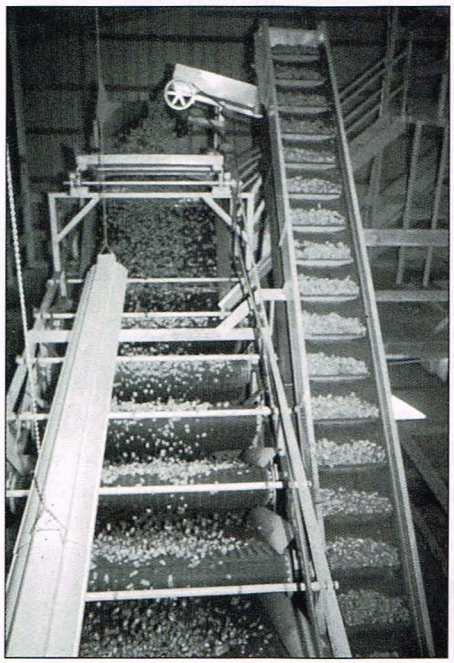
There are many other reasons that a hop doesn't make it through the breeding program or is terminated once trial production starts.

Inappropriate maturity cycle: Hop harvest usually begins around the 18th of August and goes through the end of September. If the hops were mature in mid-July, it would be difficult and costly to assemble a crew to pick them. If a hop variety matures unevenly, some plants will have cones that mature early, while other cones on the same plant are just in the burr or beginning stage. This affects yield, aroma, and acceptability in the harvested hop.

Poor aroma: There was once a test plot that smelled like garlic as you walked through it. A breeder will automatically eliminate hops that have an unappealing aroma. This is a very subjective area in the breeding programs.

Unacceptable resin/oil content: The hop may have unacceptably low alpha or oil content. In this case there is no need to look any further. Sometimes the cultivar may be discarded for having too much oil, but hops aren't discarded for too much alpha resin.

High cohumulone content: Large commercial brewers seem to favor hops with a low cohumulone (a component of alpha acid). Therefore, the breeder automatically has a prejudice against any hop showing a high cohumulone.



Processing hops after harvesting involves the use of conveyor belts. Misshapen or hard hop cones make the process more difficult.

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Some brewers feel that a high cohumulone imparts a harshness to the beer, though others dispute this. There are some hops that have a higher cohumulone content, such as Galena, that are grown commercially.

Brittle plants: A brittle hop stalk may break easily in the wind or from tractors. In this case the attached cones will die. Brittle plants in the picking process will cause problems separating the cones from their vines.

Hard or misshapen cones: Cones that are prone to shatter in the picker can't be easily separated from the other material and are therefore lost. The cones might be very hard to pull away from the vines, so too much of the leaves and stalk material are gathered, leading to a "dirty picked hop."

During the picking process some leaf and stem material comes off with the cones. Part of the cleaning process involves short, angled conveyor belts. As the hops, leaves, and stems go over these belts, the round cones roll backward off the forward-moving belts. The flat leaves and stem material stay on the belts, thus separating this material from the cones. This leaves a clean product to eventually put into bales. A cone that is too square makes this process difficult if not impossible.

Tendency to oxidize: The hop may be subject to extremely rapid oxidation or deterioration.

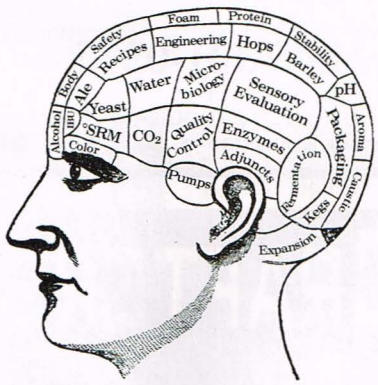
Breeder bias: One big reason that a hop can be discarded is the bias of the breeder. Breeders are usually looking for particular qualities in specific breeding programs and will automatically irradicate any hop not meeting the criteria. An example is the Willamette hop, which was bred to be like a Fuggle. Undoubtedly the breeder had many crosses in the program that didn't smell like Fuggle. Even though they were brothers and sisters to the Willamette, they were eliminated from the program. Some of the eliminated hops may have been quite nice, but the breeder was only interested in finding a hop similar to Fuggle at the time.

Brewery favorites: Finally, even if a potential new hop meets all the positive qualifications that a breeder is seeking, the hop must be approved by the brewers to use in making beer. Otherwise there is no reason to grow it. If a hop, say your ideal hop that's between Cascade and Centennial, catches a brewer's attention, it can be grown on test plots and delivered to the brewer for further evaluation. But that doesn't mean you'll be able to buy it at the homebrew supply store anytime soon. This process can take many years.

It was historically the case for a hop to take at least 10 years to go through the complete process of breeding and evaluation before becoming a commercially grown variety. Today this can happen a little faster, but it can still take years. At the end of the testing by brewers, many hops still end up being discarded. The lucky few will go on to be grown commercially and will eventually make it into your beer. ■

Ralph Olson is vice president of Hopunion USA.

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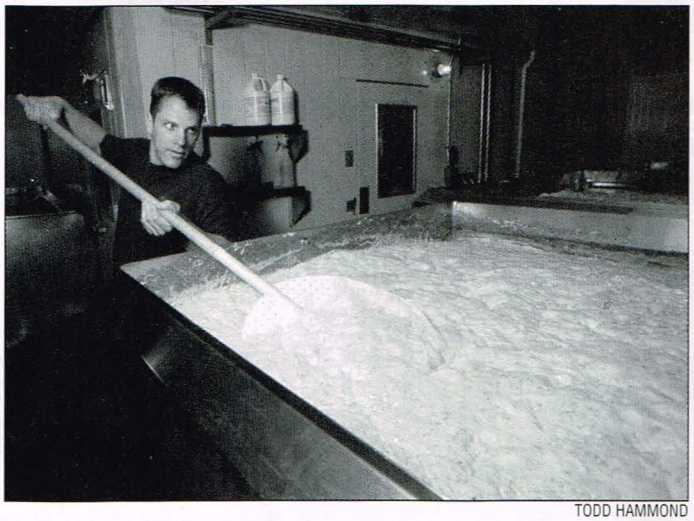
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The Natural Way to Carbonate

by Alex Fodor

What is a German-style homebrewer to do? The poor fellow has sworn allegiance to Reinheitsgebot, the German purity law of 1516, and called all other brewers *Schweinhunden* for using ingredients other than malt, hops, water, and yeast. What many Reinheitsgebot purists fail to realize is that they cannot add priming sugar or extraneous CO_2 to carbonate their beers. Large commercial brewers solve this problem by harvesting the CO_2 from fermentation and reinjecting it into the beer. The small brewer, however, must carbonate beer naturally by kraeusening.



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Removing kraeusen during peak fermentation and adding it to your aging beer will instigate a second fermentation, resulting in natural carbonation.

The word "kraeusen" refers to the stage of fermentation in which the yeast is the most active and the foam of the beer is the highest. The brewer who kraeusens removes a portion of the fermenting beer at this point and adds it to an aging beer to instigate a second fermentation. During the second fermentation the yeast release CO_2, which gives the beer its carbonation. The new yeast activity also helps develop the flavor of the aging beer. The active yeast consume the compound diacetyl (butter). Yet the fermentation does produce some young-beer characteristics such as acetaldehyde (green apple) that will fade with two to four weeks of aging. The fresh yeast will consume any leftover sugars, making the beer slightly drier in taste.

The homebrewer who wishes to kraeusen beer has at least three different ways to go about it:

- **Traditional kraeusening.** The fermenting beer can be removed from a new batch at high kraeusen and mixed with the finished beer.
- **Priming with wort.** When the beer is initially brewed, a portion of the wort can be set aside in sealed, sanitized bottles in a refrigerator. Yeast can be added to the reserved wort a day prior to kraeusening. When the yeast seems most active, make any necessary measurements (see below) and add the fermenting beer.
- **Priming with malt extract.** Liquid or dried malt extract can be added to water and boiled for 20 minutes to make a priming solution. After cooling and transferring the wort to a large, sterilized bottle, pour in yeast and mix. When the yeast becomes

active, the solution should be added to the beer. When you prepare the priming solution, aim for a gravity close to the original gravity of the beer. Although malt extracts vary, one cup of dry malt extract and one-quarter pound of domestic liquid malt extract in one pint of beer each produce wort with a gravity of about 1.056.

For all of these methods, it's crucial to carefully measure the specific gravity of the kraeusen beer and the aged beer. These values can then be used to calculate the amount of kraeusen to add.

Kraeusening at Bottling

This can be a tricky business since kraeusening is not a process designed to produce exact carbonation levels. Traditionally, it was practiced in wooden barrels. If carbonation was too high, pressure could be released by venting. Unfortunately, when bottling you only have one shot at it. The following equation can increase the accuracy of your kraeusen. It is a simplification of George Fix's carbonation equation found in his book, *Vienna* (Brewers Publications).

K = volume of kraeusen beer in quarts
B = volume of beer in gallons
SG_B = specific gravity of the beer
SG_K = specific gravity of the kraeusen
P = ° Plato = $(SG_K\text{-}1) \times 1000/4$

$$K = \frac{SG_B}{SG_K} \times \frac{(B \times 4)}{(0.69 \times P\text{-}1)}$$

Example: Say you have five gallons of finished beer with specific gravity of 1.012 that you wanted to kraeusen. You make a second batch for this purpose. At high kraeusen the gravity of the priming beer is 1.045.
K = ?
B = 5 gallons
SG_B = 1.012
SG_K = 1.045
P = (1.045-1) x 1000/4 = 11.25

$$K = \frac{1.012}{1.045} \times \frac{5 \times 4}{(0.69 \times 11.25\text{-}1)}$$

K = 2.9 quarts of kraeusen beer

This amount will give about 2.5 volumes of CO_2, the carbonation level of most microbrews. However, results will vary depending on the precision of measurements and the fermentability of the kraeusen beer. Measure the volume of beer at least to the quarter gallon.

Kraeusening in a Keg

Adding kraeusen beer to aged beer in a keg is an easy and effective way of carbonating beer. The kraeusen should be added at a rate of 10 to 20 percent of the aged beer by volume. For example five gallons of beer would require one-half to one gallon of fermenting beer. Overcarbonating is not a big concern since any excess carbonation can be removed by bleeding off pressure.

Kraeusening is an effective, natural way to carbonate. And if you're a purist, you can still swear by the Reinheitsgebot. ■

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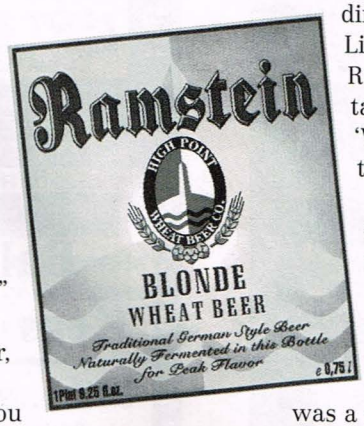
The High Point of New Jersey

by Stan Hieronymus and Daria Labinsky

Greg Zaccardi began homebrewing and drinking craft beer as a student at the University of California at Santa Cruz in the 1980s. If you had asked him then what the most important ingredient in beer is, he would have answered "hops." Ask him that question today and he'll tell you "yeast."

"I don't need a Cascades fix anymore," he says.

Zaccardi is founder, president, and just about any other title you want to give him at High Point Wheat Beer Co. in Butler, N.J. It is the first post-Prohibition brewery in the United States to produce only wheat beers.



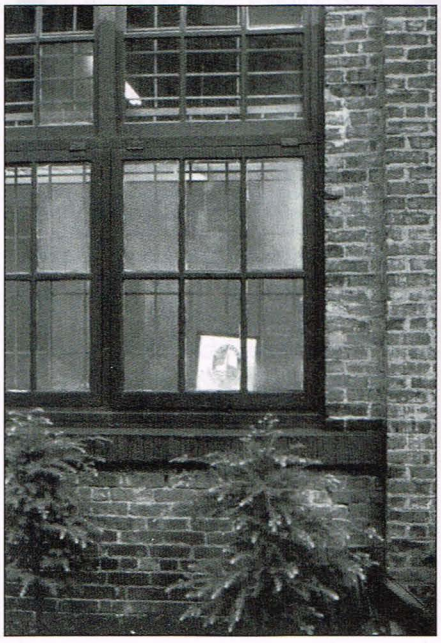
Zaccardi was introduced to weiss beers while touring Bavaria with his wife, Simone, whose family directs brewing at the Liebinger Brewery in Ravensburg, Germany. "I tasted the hefe and I said, 'Wow, there's nothing like this in the United States.'"

After graduating from college in 1989 and returning home to New Jersey to work for the Environmental Protection Agency, Zaccardi became a gonzo homebrewer. He was a certified beer judge, ran the New York City Homebrewers Guild, and started to make plans to start his own microbrewery.

"It seemed (in the early '90s) that micros were starting to duplicate themselves," he says. "You saw everybody making the same kind of beer, only using different labels." When he tasted his first Bavarian hefe-weizen, he knew he had found a completely different style. He even worked briefly at the Edelweissbrauerei, a wheat-beer brewery in Durren, Germany, to learn more about brewing wheat beers.

Zaccardi knew a two-part challenge was ahead — learning to brew the beer properly and then finding a market. "The response at first was, 'What?'" says brewer Jeff Levine, the other half of what is essentially a two-man brewery operation. "We're at the point (in consumer education) where (other) microbreweries here were five years ago."

Weisse-beer breweries are still common in Germany and were scattered throughout the United States before Prohibition, but the concept of a single-style brewery is new to the modern U.S. craft-brewing industry. Although some brewpubs and micros



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brew true-to-style hefe-weizens, and Tabernash Brewing Co. in Denver has begun to distribute its much-acclaimed Tabernash Weiss east of the Mississippi River, look no further than America's dominant brewery to see what a challenge it is to sell a Bavarian weisse. In 1995 Anheuser-Busch test-marketed Crossroads, which Goose Island Brewing Co. brewer Greg Hall aptly described as a "hefe-lightzen" with some traditional characteristics. The beer flunked the test.

Now A-B is distributing its Michelob Hefe-weizen nationally. That beer is patterned after the Northwest-style hefe-weizens made so popular by Widmer Brothers Brewing Co. Northwest hefe-weizens exhibit none of the clove, banana, or citric qualities of a Bavarian hefe and are far hoppier. The Michelob hefe checks in at 30 IBUs; High Point's beers are 13 to 15 IBUs.

Zaccardi and Levine, who sold their first beer last November, haven't backed away from the challenge.

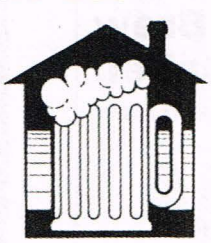
"I don't look at this as how many stainless steel (kegs) we send out the door," Zaccardi says. "I look at it as how many light bulbs we can make go off in people's heads."

Little more than six months after the brewery opened, Zaccardi was out shopping for a bottling line, and he and Levine were brewing 15-barrel batches two times a week. "The beer's been accepted incredibly well in Manhattan," Levine says. The distributor there "came and picked up his quota for a month, and four days later told us he needed more beer." After self-distributing in New Jersey, High Point turned over that territory to a distributor as well. "That was distracting us from focusing all our attention on the beer," Zaccardi says. "Just as our brewery is growing, I think we are growing as brewers...we are still changing the way we do things."

The brewers have had to overcome problems they've encountered trying to make wheat beers in a 15-barrel Criveller system designed for English-style ales. They now use the mash-lauter tun strictly for lautering and use the brewing kettle for the decoction mash, which they do to break down the starch in the wheat malt, and then for brewing. Initially they mashed in the mash-lauter tun and pumped 30 percent of the mash over to the brewing kettle through tubing built to accommodate the decoction process. However, the composition of the grist wasn't thick enough.

"You can't pull the temperature up in the mash-lauter tun for rests," Levine says. "You can pull the temperature up three degrees a minute in the kettle, as opposed to one degree every three minutes in (the mash-lauter tun)."

Now, after mashing they move 70 percent of the mash from the brewing kettle to the lauter tun, leaving behind the thickest 30 percent of the mash, which is boiled and then reunited with the rest of the mash in the lauter tun. The downside to this method is that when the mash is pumped, husks are destroyed, making lautering more difficult.

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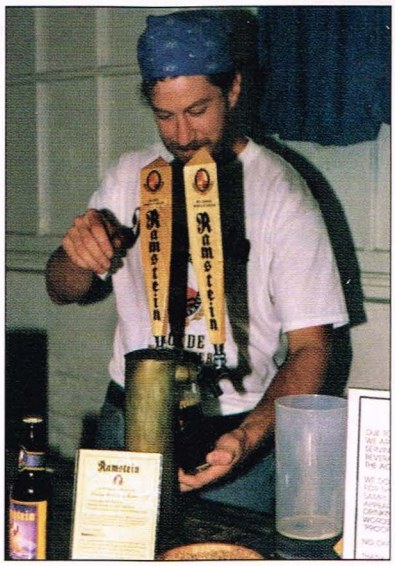
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In mid-summer High Point was using open fermenters but was considering switching to closed vertical fermenters. The converted dairy tanks used for open fermentation aren't as efficient, because about 1 1/2 barrels of each batch are left behind. Plus they take up more room and are harder to clean.

The brewery's two year-round beers, blonde and dark, primary ferment for five days — "long enough to top-harvest the yeast," Levine says — then are aged another week. They are then kraeusened — mixed with a small amount of fermenting beer — so they naturally carbonate in the kegs. They sit in the kegs at brewery temperature for 1 1/2 to two weeks.

The beers are marketed under the name Ramstein, after the German city that's home to the largest U.S. Air Force base in Europe. All the beers are made with a German yeast strain that Zaccardi got from a small Bavarian brewery, which he declines to reveal. (Levine called the yeast "the secret ingredient.") Most of the malt used is German, and the mashes are about 50 percent wheat. The beers are hopped with Tettnanger hops.



Brewer Jeff Levine pours one of High Point's two year-round beers. The beers, marketed under the Ramstein name, contain Levine's "secret" yeast.

Ramstein Blonde, a traditional German hefe-weizen with prominent yeast characteristics, accounts for about 75 percent of the brewery's output. It's on tap under a different name in several New Jersey brewpubs, including Joshua Huddy's in Toms River.

Ramstein Dark is a medium-brown dunkelweizen made with chocolate malt, which comes through in the flavor but doesn't dominate the yeast. Both beers start at about 12.75 Plato (1.051 specific gravity) and are about 5.2 percent alcohol by volume.

The lone seasonal, Winter Wheat, is described as a cross between Paulaner Salvator and Aventinus Weizen Bock.

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It's made with chocolate, carapils, and Munich malt on top of the wheat base.

"We use 25 percent more malt than in the dark to make two-thirds the size batch," Levine says. One reviewer described Winter Wheat as "a trend-setter for weizenbocks." The alcohol by volume is about 9.25 percent.

The first time Zaccardi and Levine made the Winter Wheat, it was a triple decoction brew that took about 24 hours (so now they're doing a double decoction). Clearly, Zaccardi found a head brewer who shares his zest for brewing. Levine, a longtime homebrewer and Siebel Institute of Technology graduate, builds homebrewing systems just for fun. "I tend to be able to fix anything, which is why I love working in a brewery — because you get to fix anything," Levine says. The brewhouse, which was installed before he was hired, "allows me to put my engineering skills to work."

Kristall, the brewery's attempt to attract light-lager drinkers, was a filtered version of Ramstein Blonde that never found an audience. "We couldn't brew it right," Zaccardi says. "It wasn't on a par with our other beers."

Zaccardi founded the brewery with Norm Rost, who handles the business side. "He convinced me it was in our best interest not to take on a lot of debt," Zaccardi says. They established High Point as a public company with 20 shareholders. They originally intended to open the brewery in the town of High Point, named for the highest point in New Jersey, which is marked by a monument that appears on the brewery's logo. High Point sits in rolling, wooded hills that few associate with Zaccardi's home state. "We wanted to have a positive image of New Jersey," he says.

However, High Point didn't have the suitable infrastructure (water, sanitation, and building) for a brewery, so they ended up in Butler. The city was built around the American Hard Rubber Mill, a sprawling historic building where the brewery shares space with a dozen different businesses. There's room to expand should production grow past 3,500 barrels a year.



Some of the tanks are located on a platform, reachable by a ladder.

"I want to be as big as we can and maintain quality control," Zaccardi says. He purchased a German bottling line and labeler, and bottled product should be available in New York and New Jersey by Christmas. "The draft package is the way to sell beer in Manhattan, but out here you really have to make the bottles," Levine says.

In addition the brewers will keep educating their draft accounts on how to pour the beer properly — at the proper temperature and carbonation level and with a big, fluffy head. They hope this task will be easier with the distribution of authentic wheat beer glasses bearing Ramstein labels.

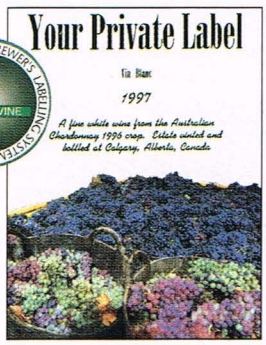
The development of High Point can be seen as a sign that the microbrewing industry has reached a level of maturity. A brewery that specializes exclusively in wheat beers is like having a bakery that makes only cookies.

Mrs. Field's, anyone? ■

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

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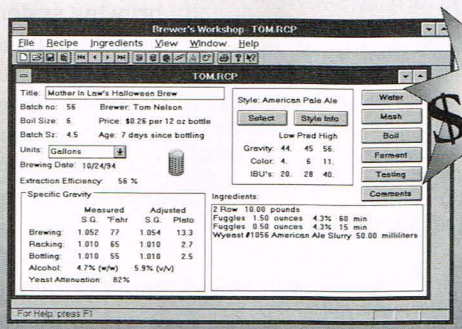
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A Neophyte's Return

by John Bowerman

I'm not a total neophyte homebrewer. I did a little back in my undergraduate days, but it was pretty grim stuff.

The fermenter was a plastic garbage can with a snug lid. The air lock was just letting the thing burp whenever it wanted to. Sanitation was pitiful at best (well, we were just a bunch of college kids). Aging usually consisted of "Hey, we're out of store-bought beer. How long has this stuff been brewing? Six days? That's long enough. We can filter out the big chunks with the aquarium net."

Somewhere between then and now, I developed a taste for beer with a lot of flavor and mouthfeel. Although I'd been working up to it, the reason I finally got started brewing again was because my girlfriend's parents came for a visit. Prior to their visit, I had a nice variety of specialty beers on hand, and a whole lot of commercial swill (hey, it was free). The same day Kate's folks left, the temperature outside broke 115° F.

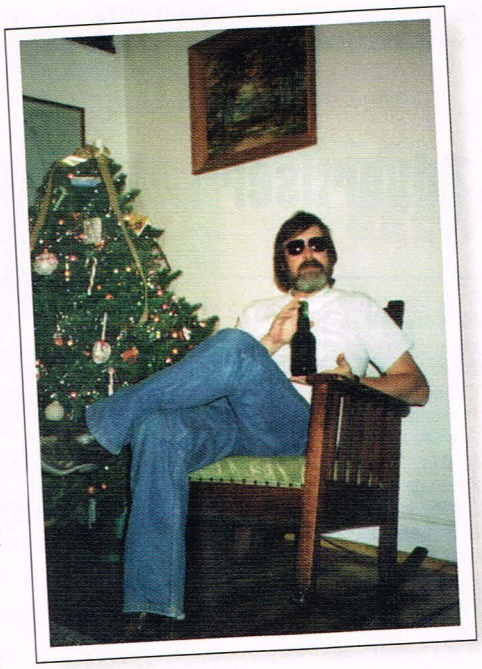
I'd been working outside and decided I wanted a nice, cool beer. After failing to find any of the good stuff, I settled on a can of swill. "It's not a wheat, but it's cold. It's wet. It'll be good."

It had been so long since I'd had one, I'd forgotten why I stopped drinking them in the first place. Then I remembered. I spit it back into the glass and decided to start brewing again.

Kate had bought me a homebrew starter kit at a local gun show the previous fall (well, she makes me go to the fabric store with her). The only thing missing was bottles. So while the brew kit gathered dust, I armed myself with a copy of a Charlie Papazian book and began making empties.

When brew day finally rolled around, I relearned two things I'd forgotten — just how good steaming malt smells, and just how bad it smells after it boils over and burns (I still haven't got all of it chipped off the stove).

During my undergraduate days in Alaska chilling the wort was easy. We just parked the kettle in a convenient snowbank and tried to remember it before it froze. In Las Cruces, N.M., my water comes out of the tap at 70° F. Even with a water bath it took more than six hours to cool (well, it was more than 90° F inside the house).



Here I proudly display my Christmas bitter, a homebrew greatly improved by a matured and experienced brewer.

At about the time the wort finally reached 75° F my starter blew the cap off the mason jar it was in, freaking out Kate and the cats (something else I forgot — don't screw the lid on tightly). Uttering a quick prayer to Bobo the Blind, patron saint of the clueless, I pitched the yeast I'd been able to save and hammered the lid on my fermenting bucket.

Without a cool place to keep it, I set the fermenter in a deep-dish pizza pan filled with water and wrapped a towel around it. By keeping the towel wet I was able to maintain 70° F while the beer fermented (now I'll just have to explain the circle of rust on the linoleum to my landlord).

Eight days later I racked the beer to a carboy and wore out three scrubbing pads cleaning the rust off the floor and Kate's pizza pan. I let the beer sit in the corner, looking like a malevolent Yoda for another week, before priming and bottling. Then came the really hard part, waiting for it to age.

Finally, I figured two weeks was long enough and popped the cap on my first homebrew in more than 20 years. Gaaaggh. It was thin tasting and weak bodied with virtually no head. Major disappointment. I stuffed all the bottles in a couple of milk crates, stacked them on the back porch, and tried to figure out what I'd done wrong.

I completely forgot about the beer until a friend stopped by. I was out of store-bought stuff but remembered my homebrew. By then I'd pretty much forgotten why I put it out back. It was great — full of body, good head, rich flavor. I still haven't figured out what happened with that first batch. I probably never will, but I've had consistently good results since then. My latest batch is a raspberry wheat beer. I'll be bottling it this weekend. First though, I've got to get the raspberries out. They really look grim. I wonder where my aquarium net is. ■

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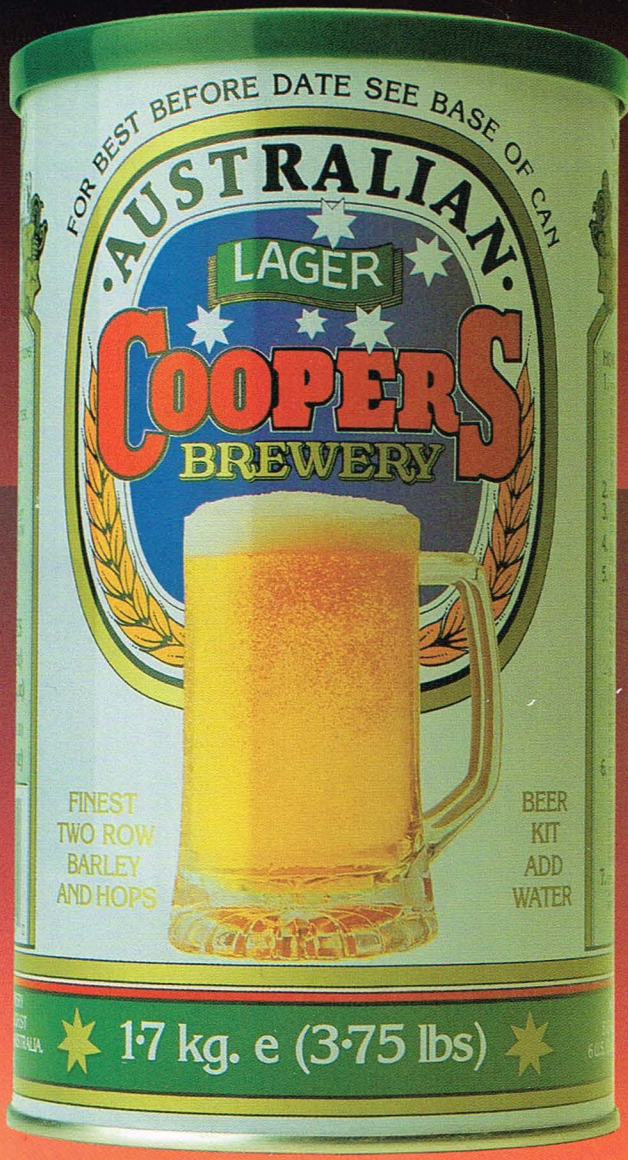
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