



Advanced Brewing Techniques with the Brew House

The Brewhouse Beer Kit is an entirely new concept in homebrewing. Until now, homemade beer has come from concentrated extract. The extract imposes a number of limitations, such as excess Maillard products (browning and caramel flavours), lack of hop aroma, and lack of fresh “grainy” character. Although extract beers can be improved with the addition of fresh hops and grains, the highest quality beer requires all-grain mashing, a time-consuming and somewhat daunting prospect. There has never been something in between for people wanting better beer with less fuss.

Our kit provides that. Brewed from fresh grain and hops, it is never concentrated and is produced the same way as commercial microbrewed beers. Gentle handling preserves the delicate aroma of the hops and prevents oxidation. Because aromas and flavours are not changed by processing, the beer is absolutely true to style. Crisp Pilsner, rich Pale Ale, malty Dark Lager, full flavoured Cream Ale and even an incredibly light North American Lager all come through with their character intact.

True to style and boldly flavourful, Brewhouse Kits are as near perfection as the skills of our brewers can make them. We’re sure no finer beer kit has ever been made. However, we encourage advanced homebrewers to modify the kits to suit their tastes and to make custom brews that will be the envy of all.

The instructions with your kit cover everything you need to know to succeed. We won’t go over them except to emphasize the most important point: sanitation. Advanced homebrewers should be following sanitation procedures that most people would consider demented overkill. And such procedures should be regarded as barely adequate. If you can completely exclude spoilage organisms from your brewing area and equipment, they can never harm a batch of your beer.

The rest of this handout will cover two broad categories: Processing Techniques and Ingredient Additions. Advanced processing techniques such as full wort boiling, chilling and lagering can bring you close to making perfect beer. Adding traditional beer ingredients—such as grains, hops and yeast, as well as fruits, herbs, spices and specialty sugars can greatly modify your wort kit.

(A note on adding ingredients to your kit: all our styles are consistent with the American Homebrewers Association’s guidelines for hop bitterness, aroma, colour, gravity and flavour. If you modify the wort kit, it will no longer be true to the original style. On the other hand, you just might create something new.)

Processing Techniques

Full Wort Boil

If you are going to add bittering or flavouring hops to the kit, you’ll want to boil them with the full

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volume of reconstituted wort to meld the flavours properly. For this you'll need a pot with a capacity of approximately 30 litres (23 litres of wort volume and 25% extra). Likely vessels include canning kettles from department stores, stainless steel pots from a restaurant supply, or some form of converted stainless steel keg. Make sure your heat source is sufficient. The average kitchen stove puts out 8,000 to 12,000 BTUs, and you'll want at least twice that. Propane burners from outdoor outfitters work well and most can be fitted for natural gas if you prefer it.

Forced Cooling

When doing a full wort boil, forced cooling becomes necessary. 23 litres of wort can take over 12 hours to cool to yeast pitching temperatures, which is long enough for diacetyl compounds to accumulate (producing butter or butterscotch aromas) and bacteria to multiply. The way to prevent these dangers is to cool the wort as quickly as possible, either by immersing your brew pot in cold water or by using a chiller. Carrying 23 litres of boiling wort to a full bathtub and wrestling it in is not only dangerous, it's hard on the carpets and the back. However, if you don't have a proper wort chiller, it may be your only alternative.

Wort chillers come in two forms: immersion and counterflow. An immersion chiller (see Fig 2.) is easiest to construct and use. It consists of 3/8 or 1/2-inch copper tubing coiled closely enough to fit inside your brew pot. One end has fittings that allow it to be hooked up to your cold water tap; the other end is fitted with a hose that drains into your sink. The chiller is immersed in the wort for the last 5 minutes of the boil to sanitize it (it must be clean, but the boil will take care of sanitizing) and then it's attached to the tap. The cold water flowing through the coil will carry the heat out of the wort and down the drain. A counterflow chiller is more difficult to construct and use. It consists of a similar coil of copper tubing, this time inserted inside a garden hose. Since it cannot be immersed in the boil, the chiller must be sanitized extremely carefully. The wort is syphoned through the copper tube to a fermenter while cold water is run through the garden hose in the opposite direction, carrying the heat away. Fast and extremely efficient though it may be, you can never be sure a counterflow chiller is completely sanitized.

Lagering and Cold Conditioning

At first glance, these may seem like the same thing. In both cases you are holding the beer at a low temperature for a period of days or weeks. The aim, however is different.

Lagering is a secondary fermentation at temperatures as low as 4°C for at least three weeks. At this temperature a true lager yeast ferments very slowly, giving a wonderful "cleanness" that allows the full flavour of the malt and hops to come through. The beer also drops most of its suspended particles including the proteins responsible for chill haze.

Cold conditioning is holding a finished ale at temperatures close to freezing for anywhere from a few days to a week or more. Fermentation ceases and the yeast drops out of suspension, leaving a clear beer with a smooth flavour. In commercial breweries, beer is often filtered at this low temperature since this is where chill haze shows up and can be removed.

Cold conditioning can be done to any beer, but lagering requires a liquid lager yeast for success. Both procedures are best accomplished in a refrigerator dedicated to your beer. External thermostats that cost about \$50.00 Canadian can convert a refrigerator or chest freezer to a lagering cabinet. Remember, when attempting to cold condition or lager, the temperature not only needs to be cold, it must also be steady. Fluctuating temperatures can make the yeast produce off flavours, spoiling the beer.

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Adjusting the Level of Fermentable Extract

You can manipulate the beginning specific gravity of your Brewhouse kit by adding more or less water to the primary fermenter. The kits contain 15 litres of wort brewed to an original gravity between 1.070 and 1.080, depending on the style. When diluted with 8 litres of water, the wort's original gravity drops to between 1.040 and 1.055. If you add only 4 litres of water, the gravity will be 1.055 to 1.065 and the alcohol content of the finished product will go up 1 to 1.5%. Or you can add no water at all. Smaller additions of water would lead to the following style changes:

Intended Brewhouse Style	With 4 litres water	With no water addition
Munich Dark Lager	Bock	Doppelbock
Pale Ale	English Old Ale	American Barley Wine
Pilsner	Maibock (perhaps)	Belgian Dubbel
Premium American Lager	----	----

Expect the undiluted beers to have a very estery quality, with fruity sometimes banana-like aromas and flavours.

Adding more water to the kit is another option, although we feel there is little to recommend it. Not only will hop rates and colour be reduced, the alcohol content and the flavour will be diluted. Experiment with this if you like.

Aerating the Wort

In the kit instructions you are directed to vigorously stir the wort. This is very important for a thorough fermentation since yeast has a two-stage life cycle. In the beginning it goes through a growth stage in which it reproduces until reaching culture strength. Then the second stage begins: the yeast metabolizes sugars in the wort, converting them to alcohol and carbon dioxide. During the first stage, but at no other point, the yeast requires plenty of dissolved oxygen—so don't skimp on the stirring.

If you are boiling the wort to add more hops, sugars or grains (more on this later), stir only after it has cooled to yeast pitching temperature. Hot stirring can create some unpleasant oxidized flavours in the beer.

Ingredient Additions

Hops

Adding extra hops is an excellent way to customize your wort kit. Even though each kit is well hopped and has a balanced flavour, if you are like most homebrewers you'll find that after a while there is no such thing as too much hops. Unless you are confident about your tastes, however, make sure you stick to classic varieties. Some of the hybrids and new super-alpha hops can provide unusual flavours and aromas if used inappropriately. For North American beers try Cascade, for German beers use Hallertau and Tettnang, and for English beers Goldings and Fuggles are good. (We do not advise adding hops to the American Premium Lager. Being extremely light-bodied, it could easily be made undrinkable by injudicious hop additions.)

When adding bittering hops, you will have to boil of the full volume of wort for 1 hour. To compensate for evaporation, add 1 to 1.5 litres of extra water at the beginning. Flavouring hops should go in for 15 to 30 minutes, and aroma hops are usually boiled for less than 5 minutes. Dry hopping can give a wonderful aroma to your beer. These hops are added to the secondary fermenter without boiling. If you

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wish to dry hop, use hops appropriate to the beer style and start off with small doses, say 28 grams. Use pellet hops since they will easily settle to the bottom and won't interfere with subsequent racking.

Grain

If you want to change the colour of your beer, give it more residual sweetness, or add more roasty flavours, you will need to add specialty grains. Because these are used to flavour and colour the wort, you only have to steep them—no mashing is required. Suitable grains include crystal malt, cara-pils, chocolate malt, black patent, roast barley, rye, vienna, munich, biscuit malt, wheat, torrefied barley, oats, brown malt, distillers malt, honey malt and a host of others. There isn't room to cover what all these grains can do for you, so consult one of the brewing texts listed in the appendix or try Zymurgy magazine's "Great Grain Issue" (Vol. 18, No. 4, 1995).

To use the grains, crush them, place them in a hop bag or muslin sack, and steep them in water. For every kilogram of grain, use 4 litres of water at 75°C and steep for 20 minutes. This will extract the colour and flavour without difficulty or mess. Don't worry about maintaining the temperature—as long as it was 75°C at the beginning everything will be fine. Discard the grains and use the liquid to top up your kit for the full wort boil. If you're not doing a full boil, you should boil the grain liquid separately for at least 20 minutes before adding it to the kit. Remember to cool it first.

Boiling the liquid is very important. Grains are exposed to spores, molds and fungi during processing and storage; steeping will not kill these bugs. If you don't boil the liquid before adding it to the kit, you may be introducing potential spoilage organisms into your wort.

Brewing Sugars

The question of sugar always raises eyebrows among homebrew purists. If the point of the Brewhouse Kit is to make all-grain beers without adjunct sugars, why would you want to add them now? The answer lies in the brewing traditions of other countries. Here in North America, commercial breweries use large amounts of cheap starch and sugar adjuncts as well as industrial enzymes. Such brewing practices leave beers bland and flavourless. Homebrewers have understandably come to feel that using sugar is "cheating" and wish to avoid it.

However, other brewing traditions use sugar to great advantage. For the British and the Belgians, certain styles of beer would not be possible without the use of brewing sugars. Duvel, Theakston's Old Peculier, and many other classic beers have sugar in the kettle. But the old world brewmasters use this sugar to enhance an already luscious, full-bodied beer made with plenty of grain and hops. They're not simply extending a thin and tasteless industrial lager, which is where the difference lies.

Some sugars appropriate to brewing are cane sugar, corn sugar, Belgian candi sugar, honey, maple syrup, molasses, rice extract, malt extract, maltose, demerera sugar, and wheat syrup. There are, of course, many others.

Remember that too much extra fermentable sugar may leave the beer's flavour and alcohol level unbalanced. Sure, you can load up a beer with corn sugar and make 14% ha-ha juice, but no one has yet explained why this would be a good thing (at least not coherently). If you want to use sugars, consult a good brewing book which covers varieties and quantities.

One kilogram of most dry sugars will give 10 to 15 points of fermentable extract per 23 litres of beer. This will translate into 1 to 1.25% more alcohol in the finished product. To use these sugars, either include them in the volume of your full wort boil or dissolve each kilogram of sugar in 4 litres of boiling water, cool, and use this liquid to make up the volume of the kit.

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Another kind of sugar that can be added to beer is lactose, the principal sugar in milk. Lactose is unfermentable by beer yeast, and when added to the wort will increase body and sweetness but not alcohol content. Normally, it is used in Milk Stout. (Beamish, Murphy's and Mackeson's are examples of this style.) Start small—500 grams per 23 litres—dissolving the lactose in boiling water as you would other sugars.

Liquid Yeast

Using liquid yeast is an excellent way to bring your wort kit even closer to its intended style. The dried yeast included with the kits has been chosen for its predictable fermentation qualities, but liquid yeasts will more closely resemble the strains used by commercial breweries. Purchase your yeast from a reliable retailer who can give you advice on using it. Follow the instructions on the package very carefully to ensure a rapid and thorough fermentation.

There are several manufacturers of liquid yeast cultures. One of the most widely distributed is Wyeast Laboratories' Brewer's Choice. The following list suggests Wyeast products compatible with our kits. (This is not a particular recommendation for Wyeast products, excellent though they are. At the Brewhouse we are just more familiar with Wyeast cultures than we are with other liquid yeasts.)

- | | |
|--------------------------|----------------------------------|
| • Pilsner | Wyeast 2278 Czech Pils |
| • Pale Ale | Wyeast 1056 American Ale |
| • Cream Ale | Wyeast 2565 Kolsch |
| • Premium American Lager | Wyeast 2112 California Lager |
| • Munich Dark Lager | Wyeast 2308 Munich Lager |
| • Wheat | Wyeast 3068 Weihenstephen Weizen |
| • Stout | Wyeast 1084 Irish Ale |
| • Mexican Cerveza | Wyeast 2112 California Lager |

Note that lager yeast requires steady temperatures of 4 to 10°C to work properly. If you don't have a dedicated lagering refrigerator, stick to ale yeast. To make a lager-style beer at ale temperatures, the 1056 American ale yeast is an excellent choice.

Fruits, Herbs and Spices

Most people don't associate fruit with beer, but some of the world's greatest beers contain cherries, raspberries or peaches. Likewise, Belgian specialty beers can contain coriander or orange peel, and one American micro-brew is actually a pumpkin ale. The choice and use of such ingredients is highly individual so there aren't many guidelines we can give you. Just be careful not to overpower your beer with something strongly flavoured. Remember, you'll have 23 litres of this stuff, so be sure you want to drink it.

Delicate aromatics like coriander or orange peel can be added to the fermenter like a dry hop. Fruits should be pasteurized by adding them to the wort and then holding the heat at 70°C for 20 minutes. This will kill any spoilage organisms in the fruit. However, be careful not to boil the fruit since this can cause a pectic haze which will permanently cloud your beer.

Final Thoughts

We've produced the finest beer kit on the market and are confident it is going to give you the best beer you have ever made. However, because we started out as homebrewers, we haven't forgotten that the heart of homebrewing is experimentation. That's why we're encouraging you to use your Brew House kit

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to make a beer that's truly your own.
Remember, the best beer is one you made yourself!

Further Reading

For Beginning and Intermediate Brewers:

Brewing The World's Great Beers by David Miller. Vermont: Storey Publications, 1992. Well organized and complete book which covers all the basics.

Brewing Quality Beers (2nd edition) by Byron Burch. California: Joby Books, 1993. Simple and inexpensive beginner's book dealing with ingredients and techniques.

The Complete Handbook of Home Brewing by David Miller. Vermont: Storey Publications, 1988. Complete and exhaustive. An excellent resource for the new brewer.

The New Complete Joy of Homebrewing by Charlie Papazian. New York: Avon Books, 1984. The original homebrewing book. Somewhat unfocused for the beginner.

Advanced Techniques for the Experienced Brewer:

Brewing by Lewis and Young. London: Chapman and Hall, 1995. Biochemistry, technology and analysis make this a text for professionals or information junkies.

Brewing Lager Beer by Gregory J. Noonan. Colorado: Brewers Publications, 1986. Excellent reference for brewing any type of beer. Probably the best text for advancing your brewing skills.

Principles of Brewing Science by George Fix. Colorado: Brewers Publications, 1989. For people who can read equations and puzzle out molecular structure diagrams.

Periodicals:

Brew Your Own. 216 F Street, Suite 160, Davis, California 95616. Good, uncluttered information. Easy on the beginning brewer.

Zymurgy. PO Box 1679, Boulder, Colorado 80306-1679. Good magazine for brewers at all levels. Special issues appear once a year and often contain invaluable information.

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