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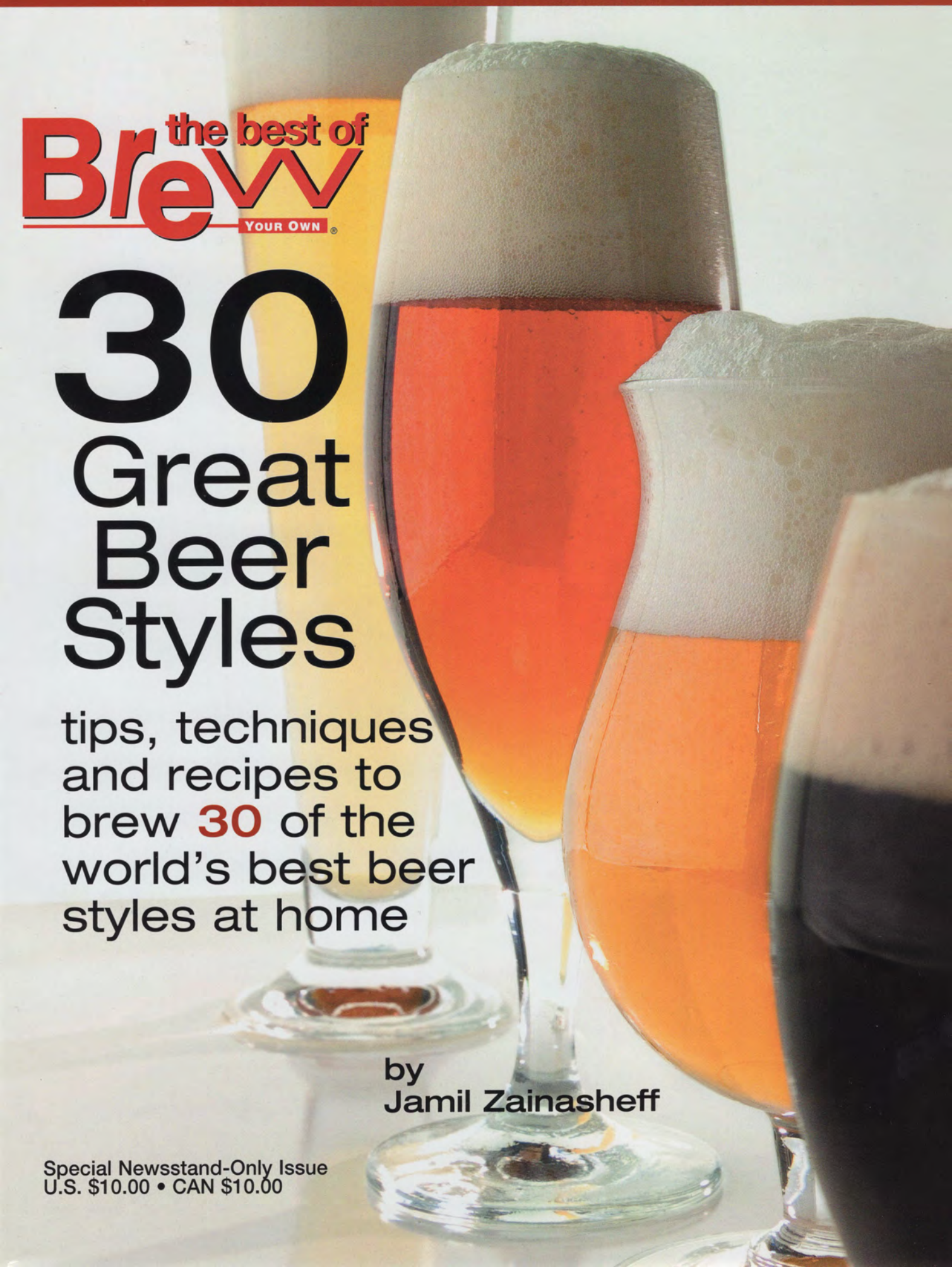

by Jamil Zainasheff

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the best of Brew Your Own

30 Great Beer Styles

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30 Great Beer Styles

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BYO RECIPE STANDARDIZATION

Extract efficiency: *65%*
(i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one gallon of water, would yield a wort of 1.024.)

Extract values for malt extract:
liquid malt extract (LME) = 1.033–1.037
dried malt extract (DME) = 1.045

Potential extract for grains:
2-row base malts = 1.037–1.038
wheat malt = 1.037
6-row base malts = 1.035
Munich malt = 1.035
Vienna malt = 1.035
crystal malts = 1.033–1.035
chocolate malts = 1.034
dark roasted grains = 1.024–1.026
flaked maize and rice = 1.037–1.038

Hops:
We calculate IBUs based on 25% hop utilization for a one hour boil of hop pellets at specific gravities less than 1.050.

BYO Recipes By The Numbers

You will notice in each of the 30 styles in this issue we feature a box on the opening page with initials and numbers. Here are the definitions of the abbreviations we use with each of the styles.

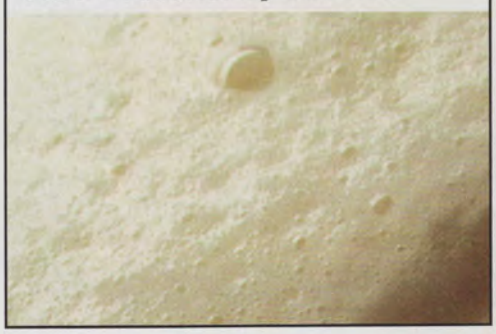
O.G. = Original Gravity (starting sugar density)

F.G. = Final Gravity (finishing sugar density)

IBU = International Bittering Units (hop bitterness)

SRM = Standard Reference Method (beer color)

ABV = Alcohol By Volume



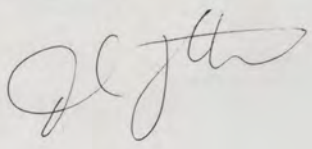
From the Author

When I first learned to love craft beer, I knew nothing about beer styles. I had no idea they even existed. I divided the beer I drank into two basic categories: mass-market beer and craft beer. As I tasted more examples of craft beer, I refined my categories to include dark craft beer, light craft beer and craft beer I did not like. It was around that time that I heard about the Beer Judge Certification Program (BJCP) and downloaded their style guide. I found it to be fascinating reading. I began to understand how different flavors and different ingredients were at the core of each style. I discovered that historical and geographical factors created the styles and someone did not just make them up on a whim. I learned that some of those beers in my "didn't like" category were actually *supposed* to taste like the business end of a goat. With this newfound knowledge, I felt like I was tasting craft beer for the first time. Learning about beer styles and revisiting various beers gave me a much more extensive vocabulary of beer flavors and aromas. After reading the style guide, I took into account things like the mouthfeel and finish of a beer. Surprisingly, I began to like many of those beers I did not enjoy before. Now I could pick out many of the more subtle aspects of the beers and I learned that balance was not just about bitterness and sweetness. I also found that a well-made example of a style is always enjoyable to drink, even if it has weird and complex flavors. After all, if a beer style was terrible to drink, then it wouldn't have been so popular historically.

Utilizing my improved knowledge, the beers I brewed improved as well. Rather than throwing in a little of this and a little of that to make the beer "malty," I learned how to make a beer with a rich malt character, like the classic styles. I brewed these beers repeatedly until they were consistent award winners. When I felt I truly understood that aspect of beer flavor, I moved on to another fundamental beer flavor. I did this for every style in the style guide, at first setting a goal of a first place award for each style and later a best of show for each style. In the end, I found that I had acquired a unique education in beer. This effort of understanding and appreciating beer styles made me a better brewer, a better beer judge, and even a better beer drinker.

I have heard some brewers say that they will not conform to "style" because it does not allow for creativity. However, understanding beer styles is important to mastering the craft of brewing. Like a great chef, you first must train in the classic dishes until you can prepare them perfectly in your sleep. Then you move on to crafting your own unique dishes. Understanding and perfecting the fundamentals gives you a foundation of knowledge that allows you to push the boundaries and truly create something new, creative, and special.

In this special issue, we feature thirty of our favorite "Style Profile" columns. I really enjoyed writing these because it gave me an opportunity to delve a little deeper into what makes a great example of a given style and why. You will find a range of popular styles that you will probably recognize, but you also might find some that you have never heard of or already decided you do not like. I urge you to tackle those unknown or unliked styles. By doing so, you will improve your ability to brew any beer, of any style, with consistent and rewarding results.



Jamil Zainasheff writes the "Style Profile" column in Brew Your Own. *He is an award-winning homebrewer, author, and host of "The Jamil Show" and "Brew Strong" shows on The Brewing Network. A "stylish" guy, Jamil has brewed every style of beer described in the Beer Judge Certification Program (BJCP) Style Guidelines and co-authored* Brewing Classic Styles *(Brewers Publications, 2007). He also founded the Heretic Brewing Company in Pittsburg, California.*

American Amber

As I walked back from Mount Rushmore while vacationing one year, I began to think about what kind of beer I would enjoy when I got back to my RV. I was feeling inspired, patriotic and quite hot and sweaty. I was much more impressed by Mount Rushmore than I anticipated and it seemed obvious that I needed something uniquely American. By the time I reached the refrigerator, my choice was clear — American amber ale.

American amber spans a wide range of characteristics. The color ranges from amber to coppery brown, the hop aroma from low to moderate, and the hop flavor from moderate to high. This is often a beer with a very clean fermentation profile, though some examples will have up to a modest amount of fruity esters. The body is medium to medium-full. The alcohol is usually restrained, but can be fairly substantial and slightly warming.

While it might be debatable how much crystal malt is appropriate for American pale ale, American amber ale should always have significant caramel flavors with a little more residual malt sweetness than American pale ales, which helps balance the hop bitterness. Some American ambers are modest and restrained while others are big, hoppy and bold. Regardless, this should always be a great, easy-drinking beer.

The Beer Judge Certification Program (BJCP) style guide mentions that this style is called red ale in some regions and amber ale in others. While there is ambiguity, I feel that people are beginning to think of the two as different substyles: amber as a gentler, more malt-focused beer with an even balance, lighter color, and more restrained hop character and red as trending toward bigger, bolder, hoppier beers like those from the US West Coast, which often have higher alcohol (in some examples over 6.5% ABV), increased bold, dark crystal flavors, and bold hop character full of American citrusy/piney flavors and aromas.

You have some flexibility in choosing base malt for American amber/red. North American 2-row will give the beer a clean, subtle background malt character. North American pale ale malt adds a slightly richer background malt character, somewhat of a light bready note. Less common is British pale ale malt, which provides an even greater depth of malt character to the beer, mainly a biscuit-like taste and aroma common in many British beers. I enjoy the more obvious malt background of British pale malt and this is one style that can handle it. However, some folks feel it can be too much, so if you prefer a more subtle, restrained malt background, go with North American 2-row or pale ale malt. Extract brewers can use a British pale ale malt extract if they want a richer malt background or a light color North American malt extract if they want a more subtle taste. All-grain brewers can use a single infusion mash and should target a mash that will leave enough long chain sugars to help fill out the body. A temperature around 152–154 °F (67–68 °C) creates wort with a nice balance between fermentable and non-fermentable sugars.

A great deal of an American amber or red's character comes from specialty malts. Every American amber/red needs a firm caramel note and experimenting with the amounts and colors of crystal malts is a great way to change the character. You can use mid-color crystal (40–60 °L), darker crystal (80–150 °L) or a combination of colors. The mid-color crystal malts add more caramel flavors, while the darker crystal malts add progressively more plum, raisin, and burnt caramel notes as they get darker. Darker crystal malts also tend to be less sweet than the lighter crystal malts. If you're brewing a more

Continued on page 7

AMERICAN AMBER
by the numbers

OG:	1.045–1.060 (11.2–14.7 °P)
FG:	1.010–1.015 (2.6–3.8 °P)
SRM:	10–17
IBU:	25–40
ABV:	4.5–6.2%

Amber Waves
(5 gallons/19 L, all-grain)

OG = 1.051 (12.6 °P)
FG = 1.013 (3.2 °P)
IBU = 35 SRM = 10 ABV = 5.1%

Ingredients

9.5 lb. (4.3 kg) Great Western 2-row malt (2 °L) (or light, North American 2-row)
0.75 lb. (340 g) Great Western crystal malt (40 °L)
0.5 lb. (227 g) Durst Munich malt (8 °L)
0.25 lb. (113 g) Great Western crystal malt (120 °L)
6.5 AAU Horizon hops (0.5 oz./14 g at 13% alpha acids) (60 min.)
1.5 AAU Cascade hops (0.25 oz./7 g at 6% alpha acids) (10 min.)
2.25 AAU Centennial hops (0.25 oz./7 g at 9% alpha acids) (10 min.)
1.5 AAU Cascade hops (0.25 oz./7 g at 6% alpha acids) (0 min.)
2.25 AAU Centennial hops (0.25 oz./7 g at 9% alpha acids) (0 min.)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C).

Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.040 (9.9 °P).

Total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left. Add other hop additions at 10 minutes remaining and flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 9 grams of rehydrated dry yeast, two packages of liquid yeast or one package of liquid yeast in a 1.5-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. Fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or if bottling rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

Amber Waves
(5 gallons/19 L, extract plus grains)

OG = 1.051 (12.6 °P)
FG = 1.013 (3.2 °P)
IBU = 35 SRM = 10 ABV = 5.1%

Ingredients

6.0 lb. (2.72 kg) Alexander's light liquid malt extract (2 °L)
0.75 lb. (340 g) Great Western crystal malt (40 °L)
0.5 lb. (227 g) Durst Munich malt (8 °L)
0.25 lb. (113 g) Great Western crystal malt (120 °L)
6.5 AAU Horizon hops (0.5 oz./14 g at 13% alpha acids) (60 min.)
1.5 AAU Cascade hops (0.25 oz./7 g at 6% alpha acids) (10 min.)
2.25 AAU Centennial hops, (0.25 oz./7 g at 9% alpha acids) (10 min.)
1.5 AAU Cascade hops (0.25 oz./7 g at 6% alpha acids) (0 min.)
2.25 AAU Centennial hops (0.25 oz./7 g at 9% alpha acids) (0 min.)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Avoid packing the grains too tightly. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle without squeezing for a few minutes while you add the malt extract. Add water to the steeping liquor and malt extract to make a volume of 5.9 gallons (22.3 liters) and a gravity of 1.043 (10.8°P). Stir thoroughly and bring to a boil.

Once the wort is boiling, add the bittering hops. Total wort boil time is one hour after adding the bittering hops. During that time add the Irish moss or other kettle finings at 15 minutes before shutdown. Add other hop additions at 10 minutes remaining and flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 9 grams of rehydrated dry yeast, 2 packages of liquid yeast or 1 package of liquid yeast in a 1.5-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. Fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or if bottling rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

restrained version of this style, you'll want to focus mainly on the mid-color crystal malts and you'll want to use less overall. If you're brewing a bigger, bolder version of this style, you'll want to include some darker crystal malts. The darker crystal malts have a more complex, bolder flavor and can help balance the higher alcohol and hop levels. Even though you have a lot of leeway, don't add a lot of low color crystal malt (< 30 °L) as it adds sweetness without much caramel character. Also watch the quantity. If the crystal malt exceeds 15% of the grist it can result in an overly sweet and heavy beer.

Even with a high level of bitterness, there is a limit to how much sweetness is acceptable. While you can balance hop bitterness with malt sweetness, that is true only to a point and it doesn't take much before the drinkability of the beer suffers. One of the other benefits of the darkest crystal malts is that any dark roasted malt can enhance the perception of dryness, and in bigger examples this can be a welcome accent. When making a big American red ale I like to add a little dark-kilned malt like pale chocolate (200 °L) to help balance the finish and add more character. Highly-kilned grains are also useful for enhancing the red color. For a deep red, a couple ounces (28–57 g) of 500 °L or darker grains can help.

For a clean, gentle pub amber, keep it simple with only the crystal malts. For a bigger, richer beer, this style can support other character grain additions. I can't get enough bready-toasty-biscuit character so I add Munich and Victory malts for about 10% of the grist on a big red ale.

You have quite a bit of flexibility in hopping this style. The bittering can range from slightly sweet to boldly bitter, with the bigger reds often being a bit more bitter. Target a bitterness to starting gravity ratio (IBU divided by OG) of 0.5 to 0.7 for a more balanced amber or 0.7 to 1.0 for a bold red. Hop flavor and aroma also varies from minimal in some ambers to over the top in some reds. Generally, reds have higher levels of hop flavor and aroma. American varieties such as Cascade, Centennial, Columbus, Simcoe and Amarillo are all suitable.

American amber/red most often has a clean fermentation profile with very low to no fruity esters. A slight fruitiness can be welcome, as long as it isn't excessive. I prefer a clean, moderately attenuating yeast, such as Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale). Oxygenate the wort and pitch an appropriate amount of clean, healthy yeast to help create a clean, American pub-style profile. Ferment around 67 °F (19 °C). Maintain that temperature throughout fermentation for a proper level of attenuation and avoiding off-flavors. Temperature swings can result in the yeast flocculating early or producing solventy and/or estery beers. BYO

American Blonde Ale

AMERICAN BLONDE ALE
by the numbers

OG:	1.038–1.054 (9.5–13.3 °P)
FG:	1.008–1.013 (2.1–3.3 °P)
SRM:	3–6
IBU:	15–28
ABV:	3.8–5.5%

Oh where have all of the American blonde ales gone? Searching aisle after aisle of the Great American Beer Festival recently, I didn't see nearly the number that would have been present in years past. Or is this just my imagination? It seems everywhere I look, breweries are pouring "special" beers. Is it that few breweries consider their American-style blonde ale special anymore? Sure, it is still a popular style amongst beer drinkers, and a style that many pubs feel they must have available to please the average beer consumer, but now it elicits little excitement from most beer geeks. What a shame, because a well-crafted blonde ale, though not complex, can be a wonderful beer. Not every beer needs to have several different character malts, exotic fruits, and aging in a barrel to be special. A really well made beer is special by itself.

Of course, on the festival floor I see a number of beers that are pale in color and labeled as "blonde." Everything from bocks to Belgians. And to some extent, commercial beer names do help define a style. I recall a conversation many years ago where a group of beer judges were discussing which commercial beers with "blonde" in their name were actually of the American blonde ale style. A few people only approved of a couple of the beers named. They had in their minds a very narrow range of characteristics, low esters, low hops, low bitterness, and low maltiness. They wanted them all to be clean, simple and balanced beers. Other people accepted a broader definition, allowing low to moderate levels for every component from bittering to esters. Like most issues, I found myself somewhere in the middle. My take on the vast majority of beer styles is that there is quite a bit of leeway in them. Sure, there are a few key aspects of each style that makes them unique and worth naming beers as belonging to that style, but if a beer is a little more hoppy or a little bit darker or has a little more of this or that, in most cases it can still be considered a good example. A beer out on the edges of a style can be as good or better of an example as a beer smack dab in the middle.

Yet you can't just call any beer a blonde ale. For example, calling a dark lager "blonde ale" just doesn't make sense, no matter what fancy name you give it. In many cases, the commercial brewers are just coming up with creative names and identifying the color of their beer. They're not saying that the beer matches a particular style as defined by the Beer Judge Certification Program (BJCP). The BJCP blonde ale style is a bit of a catchall, including beers that are lower alcohol, lower hopped versions of American pale ales, and higher hopped versions of the Kölsch style. They are all pale beers with a relatively balanced and restrained approach. Many folks think of American pub-style blonde ale as in the middle of this description and that is my focus for the rest of this article.

Blonde ale should always be a smooth, easy to drink beer with a clean fermentation profile and just a touch of malt character. Held to the light, it is light yellow to deep gold in color and usually brilliant in clarity. I prefer my blonde ale without fruitiness. A little fruitiness is acceptable, but it should be no more than a hint. Hop character is generally low to moderate, as is the alcohol level (3.8 to 5.5% ABV). A very slight residual sweetness should be offset with just enough hop bitterness to keep things balanced. It should never be heavy nor should it be overly dry or thin. It should have a slightly dry or slightly sweet finish and a medium body. Balanced and easy drinking is the key. It is a very approachable beer for people new to craft beer.

Blonde ale recipes are usually sim-

Continued on page 10

Blondinebier
(5 gallons/19 L, all-grain)

OG = 1.049 (12.2 °P)
FG = 1.011 (2.8 °P)
IBU = 20 SRM = 5 ABV = 5.0%

Ingredients

10 lb. (4.53 kg) Great Western North American 2-row malt (2 °L)
0.50 lb. (227 g) Great Western crystal malt (15 °L)
4.1 AAU Willamette hops (0.82 oz./23 g of 5% alpha acids) (60 min.) or substitute with Glacier, U.S. Fuggle, U.S. Tettnang or Styrian Golding hops
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around .5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C).

Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.038 (9.5 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast or one package of liquid yeast in a 1.4-quart (1.3-L) starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. At this temperature and with healthy yeast, fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 volumes.

Blondinebier
(5 gallons/19 L, extract plus grains)

OG = 1.049 (12.1 °P)
FG = 1.011 (2.8 °P)
IBU = 20 SRM = 5 ABV = 5.0%

Ingredients

6.3 lb. (2.85 kg) Alexander's North American light liquid malt extract (2 °L), or substitute 5.1 lbs. (2.3 kg) fresh, light dried malt extract
0.50 lb. (227 g) Great Western crystal malt (15 °L)
4.1 AAU Willamette hops (0.82 oz./23 g of 5% alpha acids) (60 min.) or substitute with Glacier, U.S. Fuggle, U.S. Tettnang or Styrian Golding hops
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 0.5 gallons (~2 L) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags.

Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.042 (10.4 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. During that time add the Irish moss or other kettle finings at 15 minutes before shut-down.

Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 9 grams of properly rehydrated dry yeast, 2 packages of liquid yeast or 1 package of liquid yeast in a 1.3-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. At this temperature and with healthy yeast, fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 volumes.

American Brewing Company in Edmunds, Washington captures the spirit of American blonde ale in their brew's label, a year-round offering.

Web extra:

Follow Jamil's blog as he opens his own commercial brewery, Heretic Brewing:

www.byo.com/blogs/blogger/Jamil

ple, with a nice balance between simple malt flavors, bittering and a clean fermentation character, with all aspects of the beer in harmony. The fermentation character is clean and subtle, and the hop and malt character should be low key as well. You can find recipes out there with all sorts of additional grains and sugars, but a simple malt bill is best for this style. Choose high quality malt or malt extract and let the fine flavors of the base malt shine through via a clean fermentation. Most brewpubs make this as an ale, but it can also be done as a lager at slightly warmer than normal lager fermentation temperatures. If you want to add some late hop additions, keep them restrained and use only one hop variety to keep things simple and subtle.

I'm a big fan of rich malt character, but if you're targeting the traditional center of this style, you need to go clean and simple with the base malt. North American two-row malt is the standard, giving the beer that clean, subtle background malt character common to many fine American craft beers. If you want to push the boundary some, you can use North American pale ale malt for a slightly richer background malt character and a light bready note. Again, this is the type of malt character you'll find in many fine American craft brews. I would avoid British pale ale malt or continental Pilsener malt, as that adds just a bit too much base malt character. Extract brewers should use a light color malt extract. All-grain brewers can use a single infusion mash and should target a mash that will leave enough long chain sugars in the beer to help give the beer a middle of the road-type body. A temperature around 152 °F (67 °C) creates wort with a nice balance between fermentable and non-fermentable sugars.

The majority of the malt character of a blonde ale should really come from the base malt, not from specialty malts. You want the efforts of the maltster to shine through, not be masked by heavy flavors. Some folks like to use a touch of wheat, light color crystal, or some lightly toasted character malts and these can provide a welcome malt accent, but keep it simple. Try to hold yourself to no more than one specialty grain and keep the amount to no more than 10% of the grist. I prefer a touch of light colored crystal malt for a little background sweetness, at around 5% of the grain bill, but feel free to experiment with other grains of moderate color.

> "The fermentation character is clean and subtle, and the hop and malt character should be low key as well."

There is quite a bit of flexibility in the hops used for blonde ales. The bittering/malt balance can range from slightly sweet to slightly bitter, with most examples being evenly balanced. You want just enough hop bitterness to balance any residual malt sweetness, and it doesn't take much. The bitterness to starting gravity (IBU divided by OG) ratio for this style usually ranges from a modest 0.3 to a bold 0.6. If you're using a lower attenuating yeast or a lot of crystal malt, lean toward the higher end of the ratio. With a more attenuating yeast or fewer unfermentable sugars from specialty malts, target the lower end. Be aware that highly bitter or hoppy versions are going to be more like American-style pale ale than good blonde ale.

There isn't a lot of hop flavor in blonde ale and hop aroma is often non-existent or very low. Of course, there are examples where a little hop flavor peeks through, but it is still restrained and tends to come from fairly mellow hop varieties, such as Willamette. Even though this is an American style of beer, avoid using really pungent American hop varieties, such as Centennial, Columbus or Simcoe. Even when used only for bittering, their flavor can be tasted with such a simple malt bill. Use caution if these are not the hop flavors you're targeting.

Fermentation for blonde ale is straightforward. Like the majority of American-style ales, blonde ale most often has a clean profile, with very low to no fruity esters. A slight fruitiness can be welcome, as long as it isn't excessive. It is important to not leave too much residual sweetness in this beer, as residual sweetness tends to have a negative impact on the drinkability. I prefer to use a clean, moderately attenuating yeast, such as Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale). Other good options include White Labs WLP008 (East Coast Ale), White Labs WLP051 (California Ale V), or Wyeast 1272 (American Ale II). Make certain that you oxygenate the wort and pitch an appropriate amount of clean, healthy yeast for the batch you are brewing. This will help create that clean American pub-style profile in the beer. If using Wyeast 1056 or White Labs WLP001, ferment around 67 °F (19 °C), holding the temperature steady throughout fermentation. Other yeasts may require slightly warmer or cooler temperatures, depending on the strain, but 67 °F (19 °C) is a good ballpark to start in if you're unsure. Holding the temperature steady is important to getting a proper level of attenuation and avoiding off-flavors, especially if you are making a bigger beer. Letting the beer go through large temperature swings can result in the yeast flocculating early or producing solventy and/or estery beers. If you wish, you can raise the temperature a few degrees near the end of fermentation to help the yeast clean up some of the intermediate compounds produced during fermentation, but with an appropriate pitch and proper temperature control, it shouldn't be necessary.

In conclusion, give blonde a chance. even though blonde ale may not be trendy or might not seem special anymore, it never hurts to have one on hand when someone is searching for an easy-drinking pint. BYO

American Brown

It is said that the first American brown ale was a creation of homebrewers in and around Texas. It possibly started as an attempt to brew an "Americanized" version of an English brown ale, but it quickly became much more than that — more of a style of its own.

American brown ale is not just bigger, hoppier and roastier than an English brown ale. The choices for hopping, malt and fermentation create a beer with a different overall character from the English brown ales.

It may seem obvious to some, but an American brown should always be brown. It can range from light to very dark brown, but it shouldn't be black and it shouldn't be amber, which are the odd mistakes you sometimes see in recipes. The overall balance can seem a little on the sweet side up front, but it should never finish sweet. It can have a medium to fairly dry finish and a medium to medium-full body. Fruity esters are generally no more than a gentle presence and in many examples very low or none at all.

All good examples should have some level of chocolate, toasty caramel flavors and aromas. While there should be some chocolate malt character and maybe even a tiny touch of coffee, it is important to note that this should stop short of being too much like a robust porter. How bold those flavors are in each beer and the amount of residual malt sweetness as compared to the hopping, makes up the wide range of interpretations of this style.

American brown ales vary from being very hoppy, very bitter beers to beers with a more restrained hop bitterness and character. Some examples have a little sweetness up front and a rich background malt flavor that balance the hops, while others are drier, letting the hops come straight through and poke you in the tastebuds. Being an American style, you'd think that a citrusy character is a requirement, but not necessarily. Almost any hop character is fine, from restrained to bold, but the bittering should always be firm.

You have some flexibility in choosing base malt for American brown. Using domestic two-row will give the beer a clean, subtle background malt character common to many fine American craft beers. Using domestic pale ale malt adds a slightly richer background malt character, somewhat of a light bready note. Again, this is the type of malt character you'll find in many fine domestic craft brews. Less common is the use of British pale ale malt. British pale ale malt provides an even greater depth of malt character to the beer, mainly a biscuit-like taste and aroma common in many British beers. Some folks feel British pale ale malt can be too much for American styles, so if you prefer a more subtle, restrained malt background, go with domestic two-row or pale ale malt. Extract brewers can use an English pale ale extract if they want a richer malt background or a light color North American malt extract if they want a more subtle taste. All-grain brewers can use a single infusion mash and should target a mash that will leave enough long chain sugars in the beer to help fill out the body. A temperature around 152 to 154 °F (67 to 68 °C) creates wort with a nice balance between fermentable and non-fermentable sugars.

The majority of the character that defines an American brown comes from specialty malts and this is one area ripe for creativity. Every American brown needs both some chocolately dark malt notes and some caramel notes. Experimenting with the amounts and colors of crystal and roasted malts is a great way to change the character of your beer. I like to use mid-color crystal (40–60 °L), darker crystal (80–150 °L) or a combination of colors. The mid-color crystal

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AMERICAN BROWN
by the numbers

OG:	1.045–1.060 (11.2–14.7 °P)
FG:	1.010–1.016 (2.6–4.1 °P)
SRM:	18–35
IBU:	20–40
ABV:	4.3–6.2%

Dirty Water Brown

(5 gallons/19 L, all-grain)

OG = 1.048 FG = 1.011
IBU = 34 SRM = 21 ABV = 4.9%

This recipe makes an American brown on the lower side of the style; hoppy, but lower in alcohol and bittering, for those times when you want to have a couple of pints.

Ingredients

9 lbs. (4.1 kg) Great Western pale malt (2-row) (2 °L) or similar
7 oz. (200 g) Great Western crystal malt (40 °L) or similar substitute
7 oz. (200 g) Great Western chocolate malt (420 °L) or similar
4 oz. (113 g) Great Western crystal malt (60 °L) or similar
4 oz. (113 g) Briess Victory® malt (28 °L)
4.94 AAU Horizon hops (0.38 oz./11 g at 13% alpha acid) (60 min.)
7.47 AAU Amarillo hops (0.83 oz./24 g at 9% alpha acid) (15 min.)
13.14 AAU Amarillo hops (1.46 oz./41 g at 9% alpha acid) (0 min.)
Wyeast 1056 American Ale, White Labs WLP001 California Ale or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.037 (9.3 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings and second hop addition with 15 minutes left in the boil. Add the last hop addition at flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast or one package of liquid yeast in a 1.5-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. At this temperature and with healthy yeast, fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

Extract with grains option:

Replace the North American pale malt with 5.7 lbs. (2.6 kg) light liquid malt extract. For this recipe, I use an ultra-light extract made from Great Western two-row malt by Alexander's (California Concentrate Company), but any fresh, high quality light color extract made from domestic two-row malt will work well. If you can't get fresh liquid malt extract, use dried malt extract (DME). (Use 20% less dry extract by weight.) When the amount of liquid extract called for in the recipe is not easy to measure, use the most convenient liquid measure and you can make up the rest of the malt sugars with dry extract. Always choose the freshest extract that fits the beer style.

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 L) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags.

Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.041 (10.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Boil time is 60 minutes. Get the wort boiling, add your first addition of hops, then follow the boil, fermentation and packaging instructions for the all-grain version.

Janet's Brown Ale

(5 gallons/19 L, all-grain)

OG = 1.066 (16.2 °P)
FG = 1.016 (4.2 °P)
IBU = 63 SRM = 23 ABV = 6.6%

Ingredients

10.75 lbs. (4.87 kg) Great Western North American two-row malt (2 °L) or similar substitute
18 oz. (510 g) Great Western Crystal malt (40 °L)
18 oz. (510 g) Briess CaraPils® malt (1 °L)
14 oz. (397 g) Great Western Wheat malt (2 °L)
8 oz. (227 g) Chocolate malt (420 °L)
5.4 AAU Northern Brewer hops (0.83 oz./24 g at 6.5% alpha acid) (mash hop)
6.76 AAU Northern Brewer hops (1.04 oz./29 g at 6.5% alpha acid) (60 min.)
5.4 AAU Northern Brewer hops (0.83 oz./24 g at 6.5% alpha acid) (15 min.)
7.5 AAU Cascade hops (1.25 oz./35 g at 6% alpha acid) (10 min.)
7.5 AAU Cascade hops (1.25 oz./35 g at 6% alpha acid) (0 min.)
15 AAU Centennial hops (1.67 oz./47 g at 9% alpha acid) (dry hop)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Mix the first hop addition with the mash. Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.051 (12.7 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings along with the third hop addition with 15 minutes left in the boil. Add other hop additions at 10 minutes remaining and flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 11 grams of properly rehydrated dry yeast, two packages of liquid yeast or 1 package of liquid yeast in a 2.5-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. At this temperature and with healthy yeast, fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. At this point add your dry hop addition. Keep the beer on the dry hops for approximately seven days. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

malts add more caramel flavors, while the darker crystal malts add progressively more plum, raisin and burnt caramel notes as they get darker. The darker crystal malts also tend to be less sweet than the lighter crystal malts. Even though you have a lot of leeway, you don't want to add a lot of low color crystal malt (< 30 °L), as it adds sweetness without much caramel character. Also watch the total amount of crystal malt being added. If the total amount exceeds 10% of the grist, it can result in an overly sweet and heavy beer.

It is important to not leave too much residual sweetness in the beer. Even with a high level of bitterness, there is a limit to how much sweetness is acceptable. While there is some truth to the adage that you can balance hop bitterness with malt sweetness, that is true only to a point and it doesn't take much before the drinkability of the beer suffers. One of the other benefits of the darkest crystal malts is that they add a little dryness to the finish. Any dark roasted malt can enhance the perception of dryness, but each malt or grain has its own character. Some can be harsh and acrid if used in more than the smallest amount. Generally speaking, the darker the malt the less you'll need to use in an American brown. Keep in mind that you only want some restrained flavors and aromas, since you're not trying to make a robust porter or a stout of any kind. About 5% is the limit on the amount of the darker roasted malts and that should be in the 300 to 500 °L range. Use much, much less, however, if you're going darker.

If you're looking for more complexity or head retention or some other flavor in your brown it is possible to add other malts as well. CaraPils®, wheat malt, Victory® and Munich are common additions to many American brown recipes. Just use restraint so the beer doesn't become saturated with unfermentable dextrins or cloying flavors. Target between 0 and 5% for these additional specialty grains.

You have quite a bit of flexibility in hopping American brown ales. The balance of bittering versus malt sweetness can range anywhere from slightly sweet to boldly bitter. Target a bitterness to starting gravity ratio (IBU divided by OG) of 0.5 to 0.7 for a more balanced beer or 0.7 to 1.0 for a bold American brown. The BJCP guide suggests that IPA strength examples are really specialty beers, so you might want to stop short of turning your beer into a brown IPA. However, here on the west coast of the United States, IPA-strength beers in both alcohol and hops is a fairly common occurrence and nobody blinks an eye at a bold brown ale.

"It is important not to leave too much residual sweetness in the beer. Even with a high level of bitterness, there is a limit to how much sweetness is acceptable. While there is some truth to the adage that you can balance hop bitterness with malt sweetness, that is only true to a point and it doesn't take much before the drinkability of the beer suffers."

Hop flavor and aroma also varies from minimal to bold. I really like using citrusy or piney American variety hops such as Cascade, Centennial, Columbus, Simcoe and Amarillo for flavor and aroma, but there are plenty of great examples out there that use a wide variety of hops from around the world. You can use almost any hop you feel has a pleasant character as it is the overall impression that matters. You can bitter with almost any hop as well, but clean, neutral hops are most common. You want some hop character and a firm bitterness, but both should complement your malt and yeast choices.

Fermentation for American brown is straightforward. Like the majority of American ales, this style most often has a clean profile, with very low to no fruity esters. A slight fruitiness can be welcome, as long as it isn't excessive. If you do want some esters, an English-style yeast at a lower temperature is a common technique. But keep in mind those yeasts often attenuate a little lower than most American-style yeasts, so you'll need to account for that in your recipe formulation. I prefer to use a clean, moderately attenuating yeast, such as Wyeast 1056 American Ale or White Labs WLP001 California Ale. Make certain that you oxygenate the wort and pitch an appropriate amount of clean, healthy yeast for the batch you are brewing. This will help create that clean American pub-style profile in the beer. Ferment at around 67 °F (19 °C), holding the temperature steady throughout fermentation. Holding the temperature steady is important to getting a proper level of attenuation and avoiding off-flavors, especially if you're making a bigger beer. Letting the beer go through large temperature swings can result in the yeast flocculating early or producing solventy and/or estery beers. If you wish, you can raise the temperature a few degrees near the end of fermentation to help the yeast clean up some of the intermediate compounds produced during fermentation, but with an appropriate pitch and proper temperature control, it shouldn't be necessary. BYO

American IPA

The Beer Judge Certification Program (BJCP) divides the India pale ale category into three sub-styles: English, American and Imperial. Some people further specify American IPAs as being a "West Coast" IPA. Count me among those who believe West Coast IPA is its own unique style, a creative outgrowth from brewers and drinkers that love the character of American-type hops.

All IPA sub-styles are "hoppy," but there is a vast difference in the level of hops between them. On the lower end is English IPA, which, while hoppy, does not have quite as bold a hop character as is found in American IPA. In an American IPA, the hop character should always be up front and the bittering obvious. The West Coast variant takes that hoppiness further and the hop character can be sometimes almost overwhelming.

The malt character for American IPA is generally much less pronounced than in English IPA. This style is more about hops, so a clean, subtle malt character is all that is required. Some examples might include some toasty or caramel flavors, but that tends to detract from the hop character, so the use of specialty malts is less common in the West Coast examples. Mouthfeel is medium-light to medium-bodied and while there is a prominent bitterness, it is never harsh or astringent.

The BJCP style guide lists the color as medium gold to medium reddish copper, but I think the color has shifted lighter, maybe light gold to light copper. Many examples are hazy from high levels of dry hopping.

The base malt for American IPA is often North American two-row, although use of North American pale ale malt or even a British pale ale malt is acceptable. The slightly higher kilning provides a richer biscuit-like malt character that can help add balance to a highly bitter beer.

All-grain brewers should use a single infusion mash. A temperature in the range of 149 to 154 °F (65 to 68 °C) works well, although one fine commercial example, Lagunitas IPA, uses a mash temperature of 160 °F (71 °C). Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. If you are unsure, a great starting point is 152 °F (67 °C).

I like the clean, light malt character of American-style IPAs brewed with pale malt only, but some folks might prefer a richer character and will include specialty malts such as crystal. While some examples may have a touch of caramel character, I think caramel sweetness is best reserved for the smaller, less hoppy IPA versions. Do not try to balance high levels of bittering with high levels of sweetness, which results in a heavy, less drinkable beer. The type of crystal malt also makes a difference. Darker color crystal malts add richer colors, as well as some dark caramel, toasty, roasted, and raisin flavors. Lighter color crystal malts add sweeter caramel notes. The crystal malt can range from 0 to 10% of the grist. However, the darker the crystal, the less you should use. An IPA with 10% 150 °L crystal malt may not be cloying, but it can be too intense a flavor for this style. On the flip side, an IPA with all light color crystal malt will tend to be sweet and lack depth of character. Just keep in mind, though, that American IPA is not about specialty malts, but rather clean malt flavor in the background and hop character up front.

If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Munich, Vienna, Victory®, biscuit and more are common additions in many recipes, but

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AMERICAN IPA
by the numbers

OG:	1.056–1.075 (13.8–18.2 °P)
FG:	1.010–1.018 (2.6–4.6 °P)
SRM:	6–15
IBU:	40–70
ABV:	5.5–7.5%

Hoppiness is an IPA

(5 gallons/19 L, all-grain)

OG = 1.065 (15.9 °P)
FG = 1.012 (3.1 °P)
IBU = 65 SRM = 8 ABV = 7%

Ingredients

11.5 lb. (5.2 kg) Great Western Northwest Pale Ale malt (or similar North American pale ale malt)
14.1 oz. (400 g) Great Western crystal malt 15 °L (or similar)
10.6 oz. (300 g) Best Malz Munich malt (or similar)
3.5 oz. (100 g) Great Western crystal malt 40 °L (or similar)
10.92 AAU Horizon hops (0.84 oz./24 g at 13% alpha acids) (60 min.)
7.56 AAU Centennial hops (0.84 oz./24 g at 9% alpha acids) (10 min.)
10.08 AAU Simcoe® hops (0.84 oz./24 g at 12% alpha acids) (5 min.)
7.56 AAU Amarillo® hops (0.84 oz./24 g at 9% alpha acids) (0 min.)
White Labs WLP001 California Ale, Wyeast 1056 American Ale or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.055 (13.6 °P).

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 11 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 2.5-liter starter.

Ferment around 67 °F (19 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle.

Hoppiness is an IPA

(5 gallons/19 L, extract plus grains)

OG = 1.065 (15.9 °P)
FG = 1.012 (3.1 °P)
IBU = 65 SRM = 8 ABV = 7%

Ingredients

11.5 lb. (5.2 kg) North American pale ale liquid malt extract
14.1 oz. (400 g) Great Western crystal malt 15 °L (or similar)
10.6 oz. (300 g) Best Malz Munich malt (or similar)
3.5 oz. (100 g) Great Western crystal malt 40 °L (or similar)
10.92 AAU Horizon hops (0.84 oz./24 g at 13% alpha acids) (60 min.)
7.56 AAU Centennial hops (0.84 oz./24 g at 9% alpha acids) (10 min.)
10.08 AAU Simcoe® hops (0.84 oz./24 g at 12% alpha acids) (5 min.)
7.56 AAU Amarillo® hops (0.84 oz./24 g at 9% alpha acids) (0 min.)
White Labs WLP001 California Ale, Wyeast 1056 American Ale or Fermentis Safale US-05 yeast

Step by Step

If you can't get fresh liquid malt extract, use an appropriate amount of dried malt extract (DME) instead.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.055 (13.6 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 11 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 2.5-liter starter.

Ferment around 67 °F (19 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle.

restraint is important so that the beer does not become too malt heavy. In general, keep the total of all specialty grain additions to less than 15% of an all-grain grist.

To brew an American IPA you need hops with "American" flavor. Pretty much any hop that starts with a "C" is fair game, but there are a lot more that work well to produce that citrusy, piney, floral, resin, fruity and even dank character that people have come to love. Other hops that are frequently used in this style are Amarillo and Simcoe. Again, the most important aspect of this style is the character of the hops. The current version of the BJCP style guide mentions that the character is from American hops, but there are new hop cultivars from New Zealand and Australia that reportedly work quite well.

The bittering level for American IPA is in the range of 40 to 70 IBU (and West Coast styles can be higher still). While the bitterness should be firm and obvious, it should not be harsh. Keep in mind that there are many factors at play in the final impression of bitterness for the drinker. The starting and final gravities, water sulfate levels, the character of malts selected, the type of base malt, the yeast strain, the pitching rate, and even the yeast cell size have an impact on the perceived bittering. For most American IPAs, a bitterness to starting gravity ratio (IBU divided by OG) between 0.75 and 1.0 gives the proper result. As a general rule of thumb in determining late hop amounts, include at least double the amount of bittering hops. If you are making more of a West Coast-style IPA, then use double what you would in an average IPA. Keep in mind this is just a generalization, since using very low or high alpha acid hops makes the equation faulty. For an American IPA, include two or more late hop additions using two different hop varieties, totaling around 2 to 4 oz. (28 to 85 g) for a 5 gallon (19 L) batch at 20 minutes or later. You can use more than two varieties, but do not go crazy. A couple of varieties creates an interesting complexity; ten different hop varieties creates an indistinct "hoppiness." Dry hopping and the use of a hop jack are also good ways to develop hop character for this style and dry hopping is almost required for a West Coast version. Dry hopping for a week at 62 °F (17 °C) is common.

The sulfate content of brewing water affects the character of hop bitterness to a significant degree. Brewing an IPA with water that has very low sulfate content results in a "flabby" bitterness. When brewing with low sulfate water you are forced to add a large amount of hop alpha acids to develop enough bittering. However, adding large quantities of hops to get a stronger bittering can result in a resin-like character. Cutting back on the hops and adding a moderate amount of gypsum (or what is known as "Burtonizing" the water), results in a sharper, crisper hop bitterness without the resin character. Most breweries add some amount of gypsum to their bitter beers, but it is easy to overdo mineral additions, resulting in a harsh character. Most water only requires a small amount of gypsum. If you do not know the sulfate content of your water, start low, with one gram of gypsum per gallon. Generally, you should need no more than three grams per gallon. It is usually better to add less gypsum than to add more, and it only takes a small amount to accentuate hop bitterness. You can add gypsum to the mash or, if you are brewing with extract, you can add it directly to your boil kettle water before you heat it.

The fermentation character for American IPA is usually clean, with restrained esters. Many brewers use a clean "Chico" strain for this style, but do not immediately rule out using the more character rich English-style yeast strains. I would not use any of the very low attenuating strains or the ones with huge esters, but there are many of them that you can ferment cooler for a less estery character and they also attenuate really well. My favorites are White Labs WLP007 Dry English and Wyeast 1098 Whitbread. Both attenuate well and, when fermenting at lower temperatures, provide a cleaner, character with just a touch more esters that help punch up the character of the beer. If you use dry yeast, Safale US-05 is a good choice.

At moderate temperatures (65–70 °F /18–21 °C), the American yeasts produce low levels of esters. You can go higher and still get good results, but the levels of compounds such as acetaldehyde and fusel alcohols will increase with temperature and can result in a less than pleasant beer. I start fermentation in the middle of this range (68 °F/20 °C), letting the temperature rise a few degrees, slowly, over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of acetaldehyde in the finished beer to a minimum. If your situation restricts you to using less attenuative yeast, you will need to take steps to ensure enough attenuation. You can lower the starting gravity, lower the mash temperature, or replace a portion of the base malt with simple sugar to aid in drying out the final beer.

When you serve your American IPA, experiment with different carbonation levels and different serving temperatures. Warmer temperatures will often allow the beer to express more of the hop aromatics. However, warmer is not always the answer. Depending on your blend of hops, cooler serving temperatures might suppress one hop character and let another shine, so don't be afraid to test. The same goes for carbonation levels. While 2 to 2.5 volumes of CO_2 is generally a good target, higher can help express hop aroma, but also can add an acidic sharpness that might not go well with the late hop character. If you have a draft system, you can start low and then try higher levels. You should be able to find the right level based on taste. While the perfect level may not be obvious the first time you try different CO_2 levels, it is pretty obvious when the beer slips from perfect to some other level. Have fun with it and you will be surprised how much difference it makes in an IPA. BYO

American Pale Ale

AMERICAN PALE ALE
by the numbers

OG:	1.045–1.060 (11.2–14.7 °P)
FG:	1.010–1.015 (2.6–3.8 °P)
SRM:	5–14
IBU:	30–45
ABV:	4.5–6.2%

The very first homebrew I ever drank was an American pale ale my neighbor Steve handed to me over our fence. He was trying to make a beer like Sierra Nevada's pale ale. At the time, that beer was the best beer I had ever tasted and that was the beginning of my own journey into brewing.

Sierra Nevada's pale ale is now the classic example of American pale ale. The American pale ale style is an offshoot of English pale ale, when American homebrewers began brewing English pale ale with American ingredients and techniques. American pale ale is more about hops and less about malt than English pale ale. Yet, it is not just a hoppier version of an English pale ale. An American pale ale has malt character, but not nearly as much as an English pale ale should have. In addition, caramel character is far more pronounced in an English pale ale than it will be in an American version. There is also a significant difference in fermentation character and hop bitterness, with the English version showing significantly more fermentation character and the American version showing far more bitterness.

It may seem obvious, but I think an American pale should always be pale. The Beer Judge Certificatoin Program (BJCP) style guide says American pale ale can range from pale golden to deep amber, but the deeper amber is really more appropriate for the English variety of pale ale. By the time a pale ale reaches deep amber color, it often has too much caramel character or malt character overall and is better categorized as American amber instead.

The balance in a good American pale ale can range from slightly bitter to quite firmly bitter. The finish should be medium to medium-dry along with a medium-light to medium body. If you notice a fruity character, it should be coming from the hop selection, as the esters from fermentation should be low for an ale.

You might think that a citrusy character is a requirement in all American styles, but almost any hop character is fine. Generally, American pale ale is citrusy, but fruity, floral, and spicy hop character can be just as welcome. The goal is ample hop character with reasonably firm bittering.

You have some options when choosing base malt for this style. Using North American two-row will give the beer a clean, subtle, background malt character common to many fine American craft beers. Using North American pale ale malt adds a slightly richer background malt character, somewhat of a light bready note. Again, this is the type of malt character common to many fine American craft brews. Less frequent is the use of British pale ale malt. British pale ale malt provides an even greater depth of malt character to the beer, mainly a biscuit-like taste and aroma often found in British beers. Some folks feel British pale ale malt can be too much for American styles, so if you prefer a more subtle, restrained malt background, go with North American two-row or pale ale malt. All-grain brewers can use a single infusion mash and should target a mash that will leave enough long chain sugars in the beer to help fill out the body. A temperature around 150 to 154 °F (66 to 68 °C) creates wort with a nice balance between fermentable and non-fermentable sugars.

American pale ale should not exhibit a lot of specialty malt character, though it can be present. Bready, toasty, and biscuit notes are acceptable, but watch out if you use anything but the lightest caramel malts. It is easy to cross the line and end up with an American amber. If you do use caramel malts, focus more on the light color ones (<30°L) or use restraint with anything darker. Generally speaking, the darker the

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American Pale Ale (5 gallons/19 L, all-grain)

OG = 1.056 (13.8 °P)
FG = 1.013 (3.2 °P)
IBU = 40 SRM = 6 ABV = 5.7%

Ingredients

10.2 lb. (4.62 kg) Great Western North American pale malt 2 °L
10.6 oz. (300 g) Best Malz Munich malt 8 °L
10.6 oz. (300 g) Briess Victory® malt 28 °L
7.1 oz. (200 g) Great Western wheat malt 2 °L
6.89 AAU Horizon pellet hops (0.53 oz./15 g at 13% alpha acids) (60 min.)
4.5 AAU Centennial pellet hops (0.50 oz./14 g at 9% alpha acids) (10 min.)
3 AAU Cascade pellet hops (0.50 oz./14 g at 6% alpha acids) (10 min.)
4.5 AAU Centennial pellet hops (0.50 oz./14 g at 9% alpha acids) (0 min.)
3 AAU Cascade pellet hops (0.50 oz./14 g at 6% alpha acids) (0 min.)
White Labs WLP001 (California Ale) Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.048 (11.8 °P).

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 10 grams of properly rehydrated dry yeast, 2 packages of liquid yeast, or 1 package of liquid yeast in a 2-liter starter.

Ferment around 67 °F (19 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle.

American Pale Ale (5 gallons/19 L, extract with grains)

A middle of the road, more malt and hop balanced APA.
OG = 1.056 (13.8 °P)
FG = 1.013 (3.2 °P)
IBU = 40 SRM = 6 ABV = 5.7%

Ingredients

10.6 oz. (300 g) Best Malz Munich malt 8 °L
10.6 oz. (300 g) Briess Victory® malt 28 °L
7.1 oz. (200 g) Great Western wheat malt 2 °L
6.89 AAU Horizon pellet hops (0.53 oz./15 g at 13% alpha acids) (60 min.)
4.5 AAU Centennial pellet hops (0.50 oz./14 g at 9% alpha acids) (10 min.)
3 AAU Cascade pellet hops (0.50 oz./14 g at 6% alpha acids) (10 min.)
4.5 AAU Centennial pellet hops (0.50 oz./14 g at 9% alpha acids) (0 min.)
3 AAU Cascade pellet hops (0.50 oz./14 g at 6% alpha acids) (0 min.)
White Labs WLP001 (California Ale) Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

If you can't get fresh liquid malt extract, it is better to use an appropriate amount of dry malt extract (DME) instead.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 160°F (71°C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.0485 (11.8 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 67°F (19°C) and aerate thoroughly. The proper pitch rate is 10 grams of properly rehydrated dry yeast, 2 packages of liquid yeast, or 1 package of liquid yeast in a 2 liter starter. Follow the fermentation and packaging instructions for the all-grain version.

Photo by Sierra Nevada

Sierra Nevada Pale Ale, brewed by the Sierra Nevada Brewing Company in Chico, California, is one of the first — and most widely known — examples of an American pale ale.

malt the less you will want to use in an American pale. Focus your specialty malt usage more on the bready malt notes and make sure that the malt character does not start to overwhelm the easy drinking and hoppy balance that is American pale ale. CaraPils®, wheat malt, Victory® and Munich are common additions to many American pale recipes. Just use restraint so the beer does not become saturated with unfermentable dextrins or cloying flavors. Target between 0 and 15% for these additional specialty grains.

You have quite a bit of flexibility in hopping American pale ales. The balance of bittering versus malt sweetness can range from slightly bitter to firmly bitter. Target a bitterness to starting gravity ratio (IBU divided by OG) of 0.5 to 0.7 for a more balanced beer or 0.7 to 1.0 for a bold American pale. I tend to target right in between at a ratio of 0.7. If you do go toward the upper end of the ratio, just be aware that you run the risk of making something more like an IPA.

Hop flavor and aroma varies from moderate to bold. I really like using citrusy or piney American variety hops such as Cascade, Centennial, Columbus, Simcoe®, and Amarillo® for flavor and aroma, but there are plenty of great examples out there that use a wide variety of hops from around the world. You can use almost any hop you feel has a pleasant character. It is the overall impression that matters. You can bitter with almost any hop as well, but clean, neutral hops are most common. The big picture is that you want hop character and a firm bitterness, but both should complement your malt and yeast choices. Dry hopping is acceptable as well, but moderation is key. Too much will push the beer into IPA territory and can develop resin and grassy notes.

Fermentation for American pale ale is straightforward. Like the majority of American ales, this style most often has a clean profile, with very

"I really like using citrusy or piney American variety hops such as Cascade, Centennial, Columbus, Simcoe®, and Amarillo® for flavor and aroma . . ."

low to no fruity esters. A slight fruitiness can be welcome, as long as it is not excessive. If you do want some esters and a touch more malty character, a relatively clean English-style yeast such as White Labs WLP002 English Ale or Wyeast 1968 London ESB at a lower fermentation temperatures (63–65 °F/17–18 °C) can produce fine results. However, many English-style yeasts attenuate lower than most American-style yeasts, so you might need to account for that in your recipe formulation. I prefer to use a clean, moderately attenuating yeast, such as White Labs WLP001 California Ale or Wyeast 1056 American Ale. To get that clean, American-style pub character make certain that you oxygenate the wort and pitch an appropriate amount of healthy yeast. Ferment around 67 °F (19 °C), holding the temperature steady or rising slightly throughout fermentation. Temperature control is important to getting a proper level of attenuation and avoiding off-flavors, especially if you are making a bigger beer. Large temperature swings can result in the yeast flocculating early or producing off flavors. Raising the temperature a few degrees near the end of fermentation can also help the yeast attenuate fully and may help clean up some of the intermediate compounds produced during fermentation. BYO

American Wheat/Rye

The other day, my neighbor stopped by and as usual, I offered him a beer. He asked for something "light and refreshing," so I offered him a bottle of a fine commercial American wheat beer. Even though it is an American-style wheat beer, the label says "hefeweizen" and my neighbor balked, "I don't like hefeweizen. I don't like all those weird wheat beer flavors."

I used to try to explain the differences between wheat beer styles and how wheat adds little flavor. Most of the flavor in other wheat-based styles, such as German hefeweizen and Belgian witbier, come from fermentation and other ingredients. Of course, my explanation left most folks with a glassed over look. I think it adds to the confusion when breweries label American wheat beer as hefeweizen. Labeling a beer hefeweizen may even scare some consumers away if they do not care for the characteristic flavors of a hefeweizen. American wheat beer is vastly different from traditional hefeweizen. Yes, the grist is similar, but fermentation and hopping are dramatically different. American wheat has none of the spicy phenols and fruity esters of a hefeweizen and it often has more hop character as well.

Some brewers make the same mistake as many consumers, by assuming that American wheat beer should be similar to German hefeweizen. While this style can have a light fruity character (up to a moderate level of fruitiness), the fruitiness should never be pronounced and banana-like as in a German hefeweizen. As for the spicy phenolic note of a German hefeweizen, there should be none in American wheat. American rye can have a very slight spicy note from the rye, but it is never as strong or clove-like as that which comes from German hefeweizen yeast. Some commercial examples of American wheat include Widmer Hefeweizen from Widmer Brothers Brewing and Mueller Unfiltered Wheat from Springfield Brewing Company in Springfield, Missouri.

American wheat or rye beer should always be easy drinking and refreshing. This is a moderate alcohol beer (4 to 5.5% ABV) with medium-light to medium body and medium to high carbonation. Appearance ranges from straw to light gold and from clear to hazy. Good examples can vary widely from sweet to dry, but they all exhibit some grainy wheat or rye character reminiscent of crackers. The hop flavor and aroma are also variable, with some versions having no hop character, while others have a noticeable citrus, spice or floral flair. While some examples might feature prominent hoppiness, it should not overwhelm the wheat or rye character to the point where the beer drifts into the world of India pale ale. American wheat and rye should be even more balanced, easier drinking, light and refreshing.

The grist for this style is very simple: a blend of North American two-row, wheat, and sometimes rye. You want the beer to have a subtle bready note, similar to crackers or white bread. One trick that I find useful in this style is replacing a portion of the North American two-row with continental Pilsner malt (around ¼th of the total grist). Pilsner malt lends a slightly sweet, grainy malt character to a beer. If you are an extract brewer, use a wheat extract that uses Pilsner malt for the non-wheat portion. A beer like this does not have specialty malts to hide behind, so little tricks like this can stand out in a crowd. When all the other beers at the table have the same malt note, one with a touch of grainy flavor and aroma stands out as more "wheaty." I would not use something like British pale ale malt, but I would consider replacing some of the North American two-row with North American pale ale malt. The pale ale malt is kilned a little darker and adds

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AMERICAN WHEAT/RYE
by the numbers

OG:	1.040–1.055 (10–13.6)
FG:	1.008–1.013 (2.1–3.3 °P)
SRM:	3–6
IBU:	15–30
ABV:	4–5.5%

American Wheat

(5 gallons/19 L, all-grain)

OG = 1.052 (12.8 °P)
FG = 1.012 (3.0 °P)
IBU = 20 SRM = 4 ABV = 5.3%

Ingredients

5 lb. 5 oz. (2.4 kg) Great Western wheat malt (or similar) (2 °L)
2 lb. 10 oz. (1.2 kg) Great Western American two-row malt (or similar) (2 °L)
2 lb. 10 oz. (1.2 kg) Durst continental Pilsner malt or similar (2 °L)
4.15 AAU Willamette pellet hops (0.83 oz./24 g of 5% alpha acids) (60 min.)
2.25 AAU Centennial pellet hops (0.25 oz./7 g of 9% alpha acids) (0 min.)
1.25 Willamette pellet hops (0.25 oz./7 g of 5% alpha acids) (0 min.)
White Labs WLP320 (American Hefeweizen), Wyeast 1010 (American Wheat) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.040 (10 °P).

The total boil time will be 90 minutes. 30 minutes after the wort starts boiling, add the bittering hops. Add the hops according to the ingredient schedule. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. Use 9 grams of rehydrated dry yeast, two liquid yeast packages, or use a starter. Ferment at 65 °F (18 °C). Carbonate to approximately 2.5 volumes.

American Wheat

(5 gallons/19 L, extract)

OG = 1.052 (12.8 °P)
FG = 1.012 (3.0 °P)
IBU = 20 SRM = 5 ABV = 5.3%

Ingredients

7 lb. (3.2 kg) Briess wheat liquid malt extract or similar (3 °L)
4.15 AAU Willamette pellet hops (0.83 oz./24 g of 5% alpha acids) (60 min.)
2.25 AAU Centennial pellet hops (0.25 oz./7 g of 9% alpha acids) (0 min.)
1.25 Willamette pellet hops (0.25 oz./7 g of 5% alpha acids) (0 min.)
White Labs White Labs WLP320 (American Hefeweizen), Wyeast 010 (American Wheat) or Fermentis Safale US-05 yeast

Step by Step

Mix enough water with the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.044 (11 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. Add Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop additions just before shutting off the burner. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. Follow the remaining instructions for the all-grain version.

American Rye

(5 gallons/19 L, all-grain)

OG = 1.055 (13.6 °P)
FG = 1.013 (3.4 °P)
IBU = 26 SRM = 5 ABV = 5.5%

Ingredients

5.5 lb. (2.5 kg) Great Western American two-row malt (2 °L)
3.75 lb. (1.7 kg) Briess rye malt (4 °L)
3 lb. (1.4 kg) Great Western wheat malt (2 °L)
3.25 AAU Simcoe® pellet hops (0.25 oz./7 g of 13% alpha acids) (60 min.)
3.5 AAU Amarillo® pellet hops (0.35 oz./10 g of 10% alpha acids) (15 min.)
4.55 AAU Simcoe® pellet hops (0.35 oz./10 g of 13% alpha acids) (15 min.)
5 AAU Amarillo® pellet hops (0.5 oz./14 g of 10% alpha acids) (0 min.)
White Labs WLP320 (American Hefeweizen) or Wyeast 1010 (American Wheat)

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.047 (11.7 °P). Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. Add the hops according to the ingredient schedule. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Use 10 grams of rehydrated dry yeast, two liquid yeast packages or make a starter. Ferment at 65 °F (18 °C). Carbonate to approximately 2.5 volumes.

some biscuit notes. If you go this route, keep it to less than ⅛th of the total grist. That is all you need for American wheat. If you are making a rye version, you can swap out rye for wheat in whatever portion you feel is right. I like to replace about half of the wheat with rye, for a subtle spicy rye note and a touch of silkiness to the mouthfeel. If you really want the rye character to stand out, use rye for 50% of the total grist.

Many brewers want to add specialty grains to this style, such as crystal, biscuit, aromatic malts. You should avoid the urge to add specialty grains, as they can add too much sweetness or too much malt character for this style. If you are not getting enough malt character from just North American two-row and wheat/rye, then you should review your fermentation. Poor fermentation will result in a beer that is "flabby" and it masks the character of the grain. High quality malt is only apparent when you have high quality fermentation. Keep in mind this beer is more about the clean wheat/rye malt character and fermentation flavors so don't hide that with specialty malts. Almost any specialty grain is too much in this style.

American wheat/rye has a medium to medium-light body. All-grain brewers should target a mash temperature around 152 °F (67 °C), which strikes a nice balance between fermentable and non-fermentable sugars. For extract brewers, most light colored extracts will ferment out to the right level. If your extract does not attenuate enough, you should first review your fermentation parameters. Some brewers worry about protein rests when using wheat, but I do not find it necessary. Keep in mind wheat and rye malt is huskless, so if your equipment is prone to stuck mashes, you might want to add a volume of rice hulls equal to the volume of wheat and rye used.

While hop character in American wheat is usually restrained, it can range up to moderate levels with a floral, spicy or citrus hop aroma and flavor. While it is not required, most brewers tend to use less hop character in wheat versions and more hop character in rye versions. You can stick with citrusy American hop character (e.g., Cascade, Amarillo®, Centennial), but almost any pleasant hop flavor and aroma will work well. My friend Mike McDole likes to use American wheat as a testing ground for new hops. Whatever the hop variety, the clean and easy background of American wheat beer allows the hop character to come through. This is sometimes a problem in making a great American wheat/rye beer. It can be too easy to overwhelm the malt and fermentation character with hops. You want the drinker to still get at least a hint of the wheat or rye character, balanced in there with the hop bittering, flavor and aroma. A bittering addition at the beginning of the boil is all that is required. If you want more hop character, you can follow it with one or two small additions later in the boil. One or two ¼ to ½ ounce (7 to 14 g) additions per 5 gallon (19 L) batch is plenty. While you can dry hop this beer, be careful that it doesn't send it over the top. Remember, this is not a West Coast pale ale or an IPA. When making this as a rye version, you can go with a bit more hop character. I'm not sure why, but the idea of rye tends to make everyone go with more of everything.

"A bittering addition at the beginning of the boil is all that is required. If you want more hop character, you can follow it with one or two small additions later in the boil."

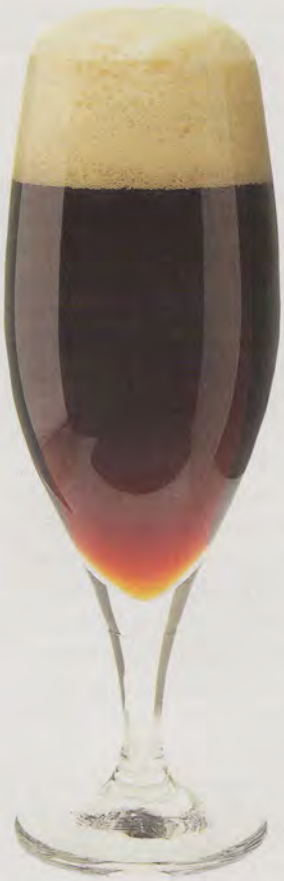
Bittering ranges from subtle to firm. If you are making a rye version, the drier the finish, the more the rye character will stand out. Too much or too little bitterness or sweetness can impact drinkability and send the beer into a different style. The bitterness-to-starting gravity ratio (IBU divided by OG) ranges widely, between 0.3 and 0.7, although most brewers will want to shoot for 0.4.

The right fermentation character for this style is clean and neutral. While esters are present, they should not be over the top. Any American-type strain should give acceptable results and even lager yeasts will perform adequately. However, the best choice is the American wheat strains from White Labs (WLP320 American Hefeweizen Ale) and Wyeast (1010 American Wheat). These yeasts provide the right balance of attenuation, have a restrained ester production and give a light crispness to the finish. I have heard that these strains are derivatives of Kölsch yeast and if you cannot source them, a Kölsch strain is an excellent choice. Other American-type yeasts like White Labs WLP001 California Ale, Wyeast 1056 American Ale or Fermentis Safale US-05 provide a decent result, but they tend to lack the subtle fruitiness and refreshing crispness that the American wheat and Kölsch yeasts provide. Whatever yeast you use, remember that your fermentation conditions affect what flavors and aromas the yeast produce. Pitching rate, oxygen level, nutrients, and temperature are like dials on your control panel of fermentation flavor. Starting with a healthy pitch of yeast, aerating or oxygenating, and controlling temperatures is key to getting a well attenuated beer that allows the subtle malt flavors to shine through. With these American wheat yeasts I like to ferment in the mid-60s Fahrenheit (~18 °C). You may find a higher or lower temperature gives you the ideal result, so do not be afraid to tweak the parameters until you get it right. BYO

Baltic Porter

BALTIC PORTER
by the numbers

OG:	1.060–1.090 (14.7–21.6 °P)
FG:	1.016–1.024 (4.1-6.1 °P)
SRM:	17–30
IBU:	20–40
ABV:	5.5–9.5%



I wasn't very impressed with the first few commercial examples of Baltic porter I tasted. They were oxidized and a bit too sweet from long travels and time spent sitting on the store shelf. Then a friend living in Finland brought me every beer he could find with the word "porter" on the label. It was an eye opening experience and convinced me that Baltic porter not only was its own style, but a wonderful one as well.

In most examples, Baltic porter is a malty-rich, slightly roasty beer with a fair amount of alcohol. Its color ranges from dark reddish copper to opaque dark brown. Even though the beer often has an initial sweetness, it finishes drier due to the roast grains and bittering hops.

Some brewers wrongly assume that Baltic porter is just a bigger robust porter. Yes, Baltic porter is bigger, richer, sweeter and more alcoholic than robust porter, but robust porter is usually hoppier and roastier than Baltic porter. They really are two very different beer styles. In Baltic porter, the fruity esters range from low to medium-high. It can have a variety of esters, but the ones that fit well with the style are dark, dried fruit flavors such as raisin, prune, fig and currants. There is also a lower gravity variant of Baltic porter, sort of like a cross between a brown porter and a classic schwarzbier. These lower alcohol examples generally have little in the way of esters, while the higher alcohol examples often carry lots of dark fruit notes. Malt character might include caramel, toffee, molasses, chocolate, bready or biscuit, and perhaps even subtle hints of coffee or licorice. Imported samples often have some Sherry or Port type notes from age and transportation stress, but don't let that fool you into thinking that oxidation makes the beer better or somehow is part of the style.

While most examples are full-bodied with a touch of creamy texture, the lower gravity versions are somewhat thinner and with less apparent alcohol. In any case, Baltic porter should never be syrupy-thick or cloying and the alcohol character should never be hot or harsh.

There are recipes out there with various base malts, but I prefer to use a healthy portion of light-to-medium color Munich malt (6–10 °L) along with some continental Pilsner malt. This gives the beer a bready, rich background malt character. You can experiment with different proportions and different suppliers until you find the blend that works best for you. I use about twice as much Munich as Pilsner and have used Vienna malt instead of Munich with nice results as well. Extract brewers can use a light-colored, blended Munich malt extract with excellent results. All-grain brewers can use a step or single infusion mash as long as the saccharification rest is low enough so that the resulting beer does not end up too viscous. A temperature range of 149 to 154 °F (65 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or high starting gravities. Use a higher temperature when using the higher attenuating yeasts or lower starting gravity beers.

While Baltic porter will have some roasted malt notes, the roast character should be restrained. Shoot for a character somewhere between a robust porter and a classic German-type schwarzbier. You want a dark, rich flavor with no highly burnt or acrid notes. The trick is to use de-bittered black malt for a portion of the grain bill. A little chocolate malt (1 to 2%) plus some de-bittered chocolate malt (2 to 3%) will provide a touch of dark malt character and a deep brown color. While the Beer Judge Certification Program (BJCP) guidelines suggest no more than a dark brown color, judges seem to prefer beers on the darker end, even nudging their way toward black. You should

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Zek's Porter

(5 gallons/19 L, all-grain)

OG = 1.089 (21.3 °P)
FG = 1.018 (4.6 °P)
IBU = 38 SRM = 30 ABV = 9.4%

My grandparents fled Russia with one of them later being captured and imprisoned in the gulag after fighting against the Soviets. The colloquial name for a Soviet gulag inmate was "zek." This recipe is for those who died under communism.

Ingredients

11 lb. (5 kg) Durst Munich malt
6 lb. (2.75 kg) Durst Pilsner malt
7 oz. (200 g) Great Western crystal malt (or similar) (60 °L)
7 oz. (200 g) Dingemans Special B malt (or similar) (140 °L)
5.3 oz. (150 g) Weyermann Carafa® Special II malt (430 °L)
3.5 oz. (100 g) Briess chocolate malt (or similar) (350 °L)
8.4 AAU Lublin hops (2.4 oz./68 g at 3.5% alpha acids) (60 min.)
2.94 AAU Lublin hops (0.84 oz./ 24 g at 3.5% alpha acids) (15 min.)
White Labs WLP885 Zurich Lager, White Labs WLP830 German Lager, Wyeast 2206 Bavarian Lager or Fermentis Saflager S-23 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 150 °F (66 °C). Hold the mash at 150 °F (66 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.069 (16.8 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methylmethionine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl sulfide (DMS) in the finished beer. Add the bittering hops with 60 minutes remaining in the boil. Add the second hop addition and Irish moss or other finings with 15 minutes left. Chill the wort rapidly to 53 °F (12 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 30 grams of properly rehydrated dry yeast, six packages of liquid yeast or two packages of liquid yeast in a 10-liter starter. Ferment at 53 °F (12 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete within a week, but do not rush it. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

Zek's Porter

(5 gallons/19 L, extract with grains)

OG = 1.089 (21.4°P)
FG = 1.018 (4.6 °P)
IBU = 38 SRM = 30 ABV = 9.4%

Ingredients

7.5 lb. (3.4 kg) Weyermann Munich liquid malt extract
4.4 lb. (2 kg) Pilsner liquid malt extract
7 oz. (200 g) Great Western crystal malt (or similar) (60 °L)
7 oz. (200 g) Dingemans Special B malt (or similar) (140 °L)
5.3 oz. (150 g) Weyermann Carafa® Special II malt (430 °L)
3.5 oz. (100 g) Briess chocolate malt (or similar) (350 °L)
8.4 AAU Lublin hops (2.4 oz./68 g at 3.5% alpha acids) (60 min.)
2.94 AAU Lublin hops (0.84 oz./ 24 g at 3.5% alpha acids) (15 min.)
White Labs WLP885 Zurich Lager, White Labs WLP830 German Lager, Wyeast 2206 Bavarian Lager or Fermentis Saflager S-23 yeast

Step by Step

Most Munich malt extract is sold as a blend of Munich and Pilsner or two-row malts. I specify 100% Munich liquid malt extract (LME) and Pilsner LME in my recipes so you will know which blends might work best for your brew. If you use a blend, replace both the Munich and Pilsner extracts with 11.9 lb. (5.4 kg) of the blend. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for 15 minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.076 (18.4 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 60 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add the second hop addition and Irish moss or other finings with 15 minutes left. Chill the wort rapidly to 53 °F (12 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 30 grams of properly rehydrated dry yeast, six packages of liquid yeast or two packages of liquid yeast in a 10-liter starter. Ferment at 53 °F (12 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete within a week.

Follow the remaining packaging and carbonation instructions in the all-grain version of this recipe.

avoid using highly kilned grains except in very small percentages, as too much will push the beer toward a robust porter or stout character. If you wan to differentiate your Baltic porter from others, try experimenting with different chocolate-type malts from different suppliers before adding a lot of higher color malts.

Another trick in developing the necessary rich malt character without too much roastiness is to add a little crystal malt. The sweetness of crystal malt adds to the perception of richness in the beer. For caramel flavors, I always use dark crystal (80 to 150 °L) as it adds those dark, raisin-plum notes that go so well in this style. I also like to include some mid-color crystal (40 to 60 °L), which adds some caramel flavors and some residual sweetness to help balance the bitterness of the roast grains and hops. Watch the total amount of crystal malt in your recipe. If the total amount exceeds 6% of the grist, it can result in an overly sweet and heavy beer. Remember that the goal is a little sweetness up front with a general malt balance and a dry finish. If the beer does not seem dry enough, it is going to be a poor example of the style. If you have already limited your specialty grains and still have trouble reaching a proper level of attenuation, replace a small portion of the base malt with simple sugar to help the beer finish a bit drier.

If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Victory®, biscuit and more are common additions in many recipes, but restraint is important so that the beer does not become saturated with non-fermentable dextrins and cloying flavors. Keep the total of all specialty grain additions to less than 10%.

The hop flavor and aroma is restrained in this style. Late hop additions are acceptable, but they should not show up in the aroma and should not result in more than a moderate level of spicy or floral hop flavor. Typical hop additions for this style are Lublin or Saaz types. Any spicy or floral hop is acceptable as long as you keep the overall level of hop character within the limits. You can bitter with a wide variety of hops, whether it is spicy and floral or clean and neutral. Magnum is a nice choice if you want to use a higher alpha hop for bittering.

Baltic porter should have a medium-low to medium bitterness, and the residual sweetness should result in a balanced beer. The bitterness to starting gravity ratio (IBU divided by OG) can range anywhere from 0.25 to 0.5 or more, but I like to target approximately 0.4. I use less bittering in smaller beers and more bittering in bigger beers. Keep in mind that beers designed for long-term aging should target the higher end of the scale, as a good amount of the bitterness can drop out of the beer over time.

> "Any spicy or floral hop is acceptable as long as you keep the overall level of hop character within the limits."

While Baltic porter should have some dark, fruity esters, it is similar to bockbier, where much of that character comes from the malt and alcohols, not from using an estery yeast strain. Try for a clean, cooler fermentation, focused on proper attenuation of the higher than average starting gravity. The most important aspect is avoiding hot, unpleasant alcohols or an overly sweet finish. You do not want the drinker recoiling from harsh alcohol. Instead, you want them to drink the beer and then feel a gentle warming as the beer settles in their stomach.

You can use a clean ale yeast at cooler temperatures, such as White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis US-05. These yeasts tend to attenuate well even in big beers and produce low ester levels at a range of temperatures. However, my preference is to use lager yeast, which tends to attenuate even better than these ale yeasts. White Labs WLP885 Zurich Lager, White Labs WLP830 German Lager, or Wyeast 2206 Bavarian Lager all work well in this style. If you are fermenting with lager yeast, use a cool fermentation temperature of 50 to 55 °F (10 to 13 °C). If you are using ale yeast, try fermenting around 65 to 70 °F (18 to 21 °C) depending on the yeast strain and recipe. Try to pick a temperature and stick with it. Controlling temperature is important to getting a proper level of attenuation and avoiding off-flavors, especially if you are making a bigger beer. Letting the beer go through large temperature swings can result in the yeast flocculating early or producing solventy and/or overly estery beers. However, raising the temperature a few degrees near the last third of fermentation will help the yeast clean up some of the intermediate compounds that were produced during fermentation and it will also encourage the yeast to complete attenuation.

Whatever yeast you use, remember that your fermentation conditions affect what flavors and aromas the yeast produce. Pitching rate, oxygen level, nutrients and temperature are like dials on your control panel of fermentation flavor. Starting with a healthy pitch of yeast, aerating or oxygenating and controlling temperatures are key to getting a well attenuated beer that allows the malt flavors to shine through. Tweak the parameters until you get it right.

If you are brewing a higher alcohol version, the beer will mellow and develop a bit of complexity over time. If you are making a smaller version, then it should be ready to drink when carbonated. For this style, I like to brew bigger versions and age it for three or more months. Time affects the balance and intensity of flavors, mellowing some of the harsher aspects and exposing some of the more delicate aromas and flavors. With time, it is also possible to develop vinous or Port-like qualities, which add to the complexity. BYO

Belgian Pale Ale

Mick, the bartender at the Monk's Kettle in San Francisco, serves me a De Koninck. He pours it in a traditional bowl-shaped De Koninck beer glass, called a bolleke once it is filled with beer. The beer is light copper in color with a rocky, white head. As I drink, the beer transports me back to Antwerp, Belgium, home of the De Koninck brewery. I once spent the day running around Antwerp and by the afternoon I was hot, tired, and thirsty. I eased into a bar and ordered a De Koninck, which is the everyday beer of the locals and perhaps the world's best commercial example of Belgian pale ale. A bolleke of this refreshing, easy-drinking beer quickly cooled me down, washing away the heat and exhaustion of my day and cementing itself as another treasured entry in my personal beer moment library.

Many brewers assume any Belgian beer is either high in alcohol or sour and funky, which isn't true. Belgian pale ales generally range from 4.8 to 5.5% ABV and are neither sour nor funky. They range in color from amber to copper and their bitterness ranges from 20 to 30 IBU. They are well balanced beers, with moderate alcohol levels and an even finish, making them a nice choice for whiling away a hot afternoon. De Koninck, like most Belgian pale ales, has an initial malt sweetness which trails off into an even or maybe slightly dry finish. The finish of a Belgian pale ale should be neither sweet nor overly dry. (If you're sampling these beers keep in mind that the balance of a bottled De Koninck is often a little bit sweeter after being shipped around the world.) This beer also has a malty character (grainy, bready, biscuity) and a pear and orange fruitiness that is clearly evident but not really bold. Other examples of the style, like Speciale Palm, Dobble Palm, Russian River Perdition and Ginder Ale may or may not have the same pear and orange notes, but moderate fruitiness in both the aroma and flavor is required. While the fruitiness can be readily apparent, it shouldn't be as bold as some other Belgian beer styles and it should not be so prominent that it overshadows the malt character. Any spicy phenolic notes, when present, should not be more than a low background note; a tiny touch of clove-like spiciness is all it takes. These beers should also have a slight touch of caramel malt apparent, but don't assume that means it is a sweet character. We're talking about caramel flavor, independent of the caramel sweetness. This might come across to some as a rich toasty note instead. In either case, a background note is all it takes. Overall, this is an easy-drinking, everyday beer, and it is important to brew Belgian pale ale with that in mind. Many poor examples of this style have too bold a spicy character and way too sweet a finish. It is not uncommon for new brewers to mistakenly turn this into a big, alcoholic, very phenolic beer.

If there is a key to brewing this style, it is balance and restraint. This goes for ingredients and especially for fermentation character. While there are esters and phenols from fermentation, it is much more restrained than most Belgian-style beers. It can be tricky to get all of the factors aligned for an ideal result. De Koninck is reported to go through fermentation at 77 to 80 °F (25 to 27 °C), but the times I've tried fermenting that warm, it resulted in hotter alcohols and more fruitiness than I prefer. So, for my process I use a reduced fermentation temperature around 66 to 68 °F (19 to 20 °C) which seems to better mimic the profile of De Koninck and other examples. There are many factors that work in concert with fermentation temperature to create esters and phenols in a beer, such as yeast strain, yeast health, oxygen levels, wort composition, and fermenter geome-

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BELGIAN PALE ALE
by the numbers

OG:	1.048–1.054 (11.9–13.3 °P)
FG:	1.010–1.014 (2.6–3.6 °P)
SRM:	8–14
IBU:	20–30
ABV:	4.8–5.5%

Antwerp Afternoon

(5 gallons/19 L, all-grain)

OG = 1.052 (12.8 °P)
FG = 1.012 (3.1 °P)
IBU = 27 SRM = 8 ABV = 5.3%

Ingredients

10.0 lb. (4.54 kg) Durst Pilsner or similar Belgian Pilsner malt (~1.6 °L)
10.0 oz. (284 g) Dingemans Cara45 malt (~60 °L)
4.0 oz. (113 g) Dingemans Biscuit malt (25 °L)
5.5 AAU Kent Golding pellet hops (1.1 oz./31 g) 5% alpha acid (60 min.)
1.25 AAU Kent Golding pellet hops (0.25 oz./7 g) 5% alpha acid (0 min.)
White Labs WLP515 (Antwerp Ale) or Wyeast 3655 (Belgian Schelde) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting the wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.040 (10.1 °P).

The total wort boil time is 90 minutes, which helps reduce the SMM present in the lightly kilned pilsner malt and results in less DMS in the finished beer. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil and add the last hop addition just before shutting off the burner. Chill the wort rapidly to 66 °F (19 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Ferment around 66 °F (19 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but don't rush it. The cooler than average ale fermentation temperature can extend the time it takes for the beer to attenuate fully. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 volumes.

Antwerp Afternoon

(5 gallons/19 L, extract with grains)

OG = 1.053 (13.1 °P)
FG = 1.013 (3.2 °P)
IBU = 27 SRM = 8 ABV = 5.3%

Ingredients

7.0 lb. (3.17 kg) Pilsner liquid malt extract (2.3 °L)
10.0 oz. (284 g) Dingemans Cara45 malt (~60 °L)
4.0 oz. (113 g) Dingemans Biscuit malt (25 °L)
5.5 AAU Kent Golding pellet hops (1.1 oz./31 g) 5% alpha acid (60 min.)
1.25 AAU Kent Golding pellet hops (0.25 oz./7 g) 5% alpha acid (0 min.)
White Labs WLP515 (Antwerp Ale) or Wyeast 3655 (Belgian Schelde) yeast

Step by Step

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in ½ gallon (~2 liters) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.045 (11.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. Add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last hop addition just before shutting off the burner. Chill the wort rapidly to 66 °F (19 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Ferment around 66 °F (19 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but don't rush it. The cooler than average ale fermentation temperature can extend the time it takes for the beer to attenuate fully. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 volumes.

The flagship beer brewed at the De Koninck Brewery in Antwerp, Belgium — De Koninck — is a classic example of the style of Belgian-style pale ale.

try. You may find a higher or lower temperature gives you the ideal result, so don't be afraid to tweak the parameters until you get it right.

One would think that the perfect base grain for Belgian pale ale would be Belgian pale ale malt. This is two-row malt, kilned similar to British pale ale malt. However, the most often used base malt for this style is continental Pilsner malt. Pilsner malt lends a slightly sweet, grainy malt character to the beer, different from Belgian pale ale malt. If you can source it, Belgian Pilsner malt is ideal. If you can't, don't worry, even the Belgian brewers use other continental Pilsner malts. If you're an extract brewer, try to use an extract made from Pilsner malt.

A splash of caramel malt adds color and hints of caramel flavor. Don't add so much that the beer has a bold caramel flavor or the balance becomes sweet. I've used everything from CaraVienne (~20 °L) to CaraMunich® (~40, 50 and 60 °L) with good results. I would not recommend using something lighter than 20 °L nor anything darker than 60 °L. The caramel character should be like caramel, not raisin or sweet candy. Too dark or too light a caramel malt will result in a different character for the beer; 4 to 10% caramel malt in the 20 to 60 °L range is about right.

One thing I love about some commercial examples of Belgian pale ale is the upfront grainy/bready malt character and to mimic it I like to add 1 to 3% of a specialty grain, such as biscuit, aromatic, or Munich. You can experiment with other character grains, but remember this beer is all about balance and drinkability, so don't overwhelm the base flavors with specialty malts. A little goes a long way.

Belgian pale ale has a medium to medium-light body. For all-grain brewers, a mash temperature around 152 °F (67 °C) strikes a nice balance between fermentable and non-fermentable sugars. For extract brewers, most light colored extracts will get you fairly close. If not, you can make your extract-based wort more fermentable by replacing a portion of your extract with table or corn sugar. To build body in an extract-based beer, you can steep a specialty malt such as CaraPils® to increase the non-fermentable sugars in the wort.

Bittering is also moderate, balancing any residual sweetness. Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.4 and 0.6. The bulk of the hopping should be as a bittering addition at 60 minutes. Like the other aspects of this style, hop character is restrained. Because hop flavor and aroma is not much more than a background note, you can use almost any floral or spicy hop, such as Saaz, Kent Goldings, Hallertau, Tettnang, Mount Hood or Liberty. De Koninck uses Saaz hops, but again the overall result is very subtle, especially in the bottled product. While not to style or traditional, I think this is a style that can support more hop flavor and aroma than is common in commercial examples. It isn't to style, but in the past I've enjoyed this beer with an ounce or more of hops at flame out. Don't use citrusy or catty American-type hops, as they seem to clash with, rather than accentuate, the phenols and ester from fermentation. Stick with the floral or spicy varieties if you decide to experiment with bold hop character.

> "While the fruitiness can be readily apparent, it shouldn't be as bold as some other Belgian beer styles and it should not be so prominent that it overshadows the malt character. Any spicy phenolic notes, when present, should not be more than a low background note; a tiny touch of clove-like spiciness is all it takes."

Brewery Ommegang in Cooperstown, New York brews BPA, a Belgian-style pale ale, as well as Rare Vos, a higher gravity Belgian-style pale ale than other commercial examples.

Two great yeasts for brewing this style are Wyeast 3655 (Belgian Schelde) or White Labs WLP515 (Antwerp Ale). You can't go wrong with either product. If you can't get either of those yeasts, you might try Wyeast 3522 (Belgian Ardennes) or White Labs 550 (Belgian Ale). When selecting yeast, try to pick one that produces minimal or no spicy phenols and moderate fruity esters. Whatever yeast you use, remember to work with it to keep the esters in check. You might change the pitch rate up or down and try fermentation temperatures on the cooler end of the yeasts' range. If you want to use dry yeast, your best choice is probably Fermentis Safbrew T-58. BYO

Belgian Strong Golden Ale

BELGIAN STRONG GOLDEN ALE
by the numbers

OG: 1.070–1.095 (17.1–22.7)
FG: .....1.005–1.016 (1.3–4.1 °P)
SRM: 3–6
IBU: 22–35
ABV: 7.5–10.5%

Duvel is considered the ultimate example of Belgian strong golden ale and I think they also have the best description of the style on their bottle label. It reads, "Refreshing and golden like a Pilsner but with the flavor, depth and complexity of an ale." It continues with this advice, "Enjoy chilled (40–50 °F/4–10 °C) with discerning friends or good-looking strangers."

I'm not sure about the "strangers" part, but Duvel is a great example of the style. It is golden, complex, effervescent, strong with a fruity start and a crisp, dry finish. Belgian strong golden ale ranges from 7.5 to 10% ABV with significant fruity esters, some spicy notes from fermentation (and sometimes hops), and subtle, warming alcohol notes supported by a delicate malt character. Good examples are crisp and dry with a moderately bitter balance. Carbonation is high and the body ranges from light to medium. Even though hops and malt play a role in the character of this beer style, fermentation is really the centerpiece.

One thing to keep in mind, while Belgian strong golden ale has a higher than average alcohol concentration, that does not mean it should be hot or solvent-like. Hot or solvent is never an appropriate beer character regardless of its alcoholic strength. The alcohol should be subtle and warming.

The base malt for this style is continental Pilsner malt. Pilsner malt lends a slightly sweet, grainy malt character to the beer. If you can source it, Belgian Pilsner malt is ideal. If you cannot, do not worry, even the Belgian brewers use other continental Pilsner malts. If you are an extract brewer, try to use an extract made from Pilsner malt. While it may seem like it isn't worth the trouble, a beer like this does not have a lot of specialty malts to hide behind, so it is important to use a good quality Pilsner malt extract. Pilsner malt and some table sugar is all you need. While you might find recipes with oats, wheat, CaraPils®, aromatic, Vienna, Munich, crystal malts and more, it really isn't the way to go. Specialty malts in this case (especially crystal malts) tend to make the beer heavier and fight the crisp, dry character that you are trying to achieve.

I prefer to keep it simple and stick with just base malt and sugar. If you are going to experiment, focus on the grainy/bready malt flavors (such as biscuit, aromatic, Vienna or Munich) and not the sweet ones (crystal/caramel malts). In any case, do not add more than 3% of any specialty malt. If you can taste the specialty malt in the beer, it is too much.

Since this is a bigger beer with high starting gravities, all-grain brewers should target a mash temperature around 149 °F (65 °C). For extract brewers, most light colored extracts are not fermentable enough on their own, but with a portion of simple sugar (table sugar), it should attenuate enough. You will still want to buy an extract that attenuates well or you will need to make your extract-based wort more fermentable by replacing more of the extract with table or corn sugar. When all-grain brewing you can use up to 20% of the grist weight as table sugar (the percentage by weight is higher when brewing with extract, as much as 30% of the weight when using dried malt extract) with good results.

The dryness and firm bittering of a good Belgian strong golden ale comes from alcohols, phenols, carbonation and hops. I prefer to stick with noble hops such as Saaz, Hallertau, or Tettnang. Traditionally, breweries also use Styrian Goldings and in a pinch other varieties such as Mount Hood, Liberty or Kent Goldings are fine as well. I prefer a single large charge of low alpha hops near the beginning of the boil. With the light malt character,

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Belgian Strong Golden Ale

(5 gallons/19 L, all-grain)

OG = 1.072 (17.5 °P)
FG: = 1.007 (1.9 °P)
IBU = 32 SRM = 3 ABV = 8.5%

Ingredients

9.92 lb. (4.5 kg) Continental Pilsner malt (Durst or similar) (~1.6 °L)
2.47 lb. (1.12 kg) cane or beet sugar
6.5 AAU Czech Saaz pellet hops (1.87 oz./53 g of 3.5% alpha acids) (90 min.)
White Labs WLP570 (Belgian Golden Ale) or Wyeast 1388 (Belgian Strong Ale) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. With the low mash temperature, you may need to lengthen the rest time to 90 minutes or more to get full conversion. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.056 (13.7 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methiomine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl sulfide (DMS) in the finished beer. Once the wort is boiling, add the bittering hops. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 64 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

You will need three packages of liquid yeast or you can make a 4L starter from 1 package. Pitch yeast at 64 °F (18 °C), aerate or oxygenate, and let the temperature rise slowly to 82 °F (28 °C) over the course of one week. Ferment until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but do not rush it. It is important for the beer to attenuate fully. When finished, carbonate the beer to approximately 4 volumes and serve at 45 to 50 °F (7 to 10 °C).

If you have trouble getting enough attenuation in big beers, you can hold off on adding the sugar to the boil. Instead, after the fermentation looks like it has started to slow, mix the sugar with just enough boiling water to make a syrup, then add that to the fermentation.

Belgian Strong Golden Ale

(5 gallons/19 L, extract)

OG = 1.072 (17.5 °P)
FG = 1.007 (1.9 °P)
IBU = 32 SRM = 3 ABV = 8.5%

Ingredients

7 lb. (3.18 kg) Pilsner liquid malt extract (~2.3 °L)
2.47 lbs. (1.12 kg) cane or beet sugar
6.5 AAU Czech Saaz pellet hops (1.87 oz./53 g of 3.5% alpha acids) (90 min.)
White Labs WLP570 (Belgian Golden Ale) or Wyeast 1388 (Belgian Strong Ale) yeast

Step by Step

Mix the malt extract with enough warm water to make a pre-boil volume of 6.5 gallons (24.4 L) and a gravity of 1.056 (13.7 °P). Stir thoroughly to dissolve the extract. Bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 90 minutes. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 64 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Duvel Moortgat Brewery's flagship beer, Duvel, is one of the most widely recognized commercial examples of Belgian strong golden ale.

You will need three packages of liquid yeast or you can make a 4L starter from 1 package. Pitch yeast at 64 °F (18 °C), aerate or oxygenate, and let the temperature rise slowly to 82 °F (28 °C) over the course of one week. Ferment until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but do not rush it. It is important for the beer to attenuate fully. When finished, carbonate the beer to approximately 4 volumes and serve at 45 to 50 °F (7 to 10 °C).

If you have trouble getting enough attenuation in big beers, you can hold off on adding the sugar to the boil. Instead, after the fermentation looks like it has started to slow, mix the sugar with just enough boiling water to make a syrup, then add that to the fermentation.

the flavor of that early addition will carry through and will provide a subtle hop character. Nowadays more brewers are experimenting with increased hop character in these beers, but it takes a deft hand to avoid overdoing it. A single, small addition near the end of the boil is about all you should add if you still want to consider the beer a "traditional" example. If you go with much more than that, you might find some judges marking you down in competition for excessive hop character. The bitterness-to-starting gravity ratio (IBU divided by OG) ranges between 0.25 and 0.5, although most brewers will want to target approximately 0.4 unless you are getting a very dry finish from fermentation.

The characteristic fruity/spicy flavors and aromas of this style come from fermentation, not from the addition of fruits or spices. While some brewers may add spices, the problem is that spices will never really take the place of proper fermentation. The subtle complexity that comes from fermentation can't really be faked by spice additions. It is better to focus on perfecting fermentation.

There are several great yeast strains for brewing this style, but two of my favorites are White Labs WLP570 (Belgian Golden Ale) and Wyeast 1388 (Belgian Strong Ale). Other excellent choices are White Labs WLP500 (Trappist Ale), WLP540 (Abbey IV Ale), WLP550 (Belgian Ale), Wyeast 3787 (Trappist High Gravity) and Wyeast 1214 (Belgian Abbey). When selecting yeast, keep in mind that this style is more about the fruity notes than spicy phenols.

One question that many brewers have about Belgian beers is fermentation temperature. Often homebrewers will say, "Brewery X ferments their beer at xx °F, so that is the fermentation temperature I use." That most likely won't be the right temperature for you if you are trying to make a beer like theirs. There are many other factors than temperatures. For example, fermenter height plays a role in flavor development, with very tall fermenters (like big commercial cylindroconical types) suppressing ester and fusel alcohol production. The shape of the brewery's fermenters, their pitching rates, their oxygen levels, their yeast collection and repitching methods may all be different than yours, changing the production of esters, fusel alcohols and other aspects of fermentation. Do not let "how the classic brewery does it" determine your process unless you are using the same equipment and methods. Instead, get to know the beer style intimately and work on adjusting your process until you are making an outstanding example.

With most of these yeasts I recommend pitching at a rate of 0.75 million cells per milliliter per degree Plato (see the pitching rate calculator at www.mrmalty.com for help in calculating this for your beer). Pitch the yeast and allow 12 to 36 hours for the majority of yeast growth, then ramp up the temperature for the rest of fermentation to ensure good attenuation. For example, pitch the yeast at 64 °F (18 °C) and at the end of the next day slowly begin raising the temperature each day. Try to end up at 82 °F (28 °C) by the end of one week. You may find a higher or lower temperature or a faster or slower rise in temperature gives you the ideal result, so do not be afraid to tweak the parameters until you get it right.

One concern when brewing this style is getting enough attenuation. Many brewers go with lower and lower mash temperatures in an attempt to achieve this, but that is not always the problem. It isn't that you need to get rid of all of the long chain dextrins to make a dry beer. Those dextrins are not very sweet and they can be present in a nice, dry beer. The important thing is to make sure you ferment out all of the simpler sugars completely. If you leave a lot of unfermented maltose, then the beer is going to taste sweet, even though it might attenuate well.

Oxygen is important to yeast health and is necessary for fermentation to reach terminal gravity in a reasonable amount of time. However, too much or too little oxygen can have unintended consequences, so adding the right amount of oxygen is important. That is difficult for many homebrewers, but you should try to control the amount of oxygen added by measuring timing and flow rate. The amount of oxygen required is a balancing act and can result in excessively high or low esters and fusel alcohols. If you are using air, there is no chance of over-aerating your wort, but there is a chance of under-aerating. If you are using oxygen with a sintered stone, a good starting point for 5 US gallons (19 L) is a flow of 1 L per minute for 1 minute. If you find yourself getting stuck fermentations when brewing high gravity beers, you can add a second dose of oxygen between 12 and 18 hours after pitching. The second dose should be about ½ to ¾ the normal amount of oxygen. This will give the yeast the ability to rebuild their cell membranes after having replicated.

If you are having trouble getting a dry beer, one trick is to wait until fermentation has started to slow and then add the sugar. Adding the sugar after the yeast have consumed the maltose is like telling your kids to finish their dinner before they can have dessert. When I do this I dissolve the sugar in just enough boiling water to make a thick syrup. Once it cools, I add it to the beer.

If all else fails and you still are not getting full attenuation, you can pitch an actively fermenting lager yeast into the stuck beer, which will consume some complex sugars that the ale yeast will not. Do not add this extra dose of yeast if they are not in an active fermentation state, because they will just settle out in a high alcohol, low sugar environment. Make a small starter and wait until the yeast are at high kräusen before you add it to the beer.

If your beer is attenuating properly but still tastes sweeter than it should, it might be fermentation related compounds that are making it seem sweet. If that is the case, then you need to revisit your fermentation parameters and/or try a different yeast strain. BYO

Belgian Tripel

With the popularity and availability of Westmalle Tripel in the United States over the years, it seems hard to believe that my first real taste of Westmalle Tripel was while wandering around Belgium not so long ago. Sitting outdoors at a small café, the warmth of the sun perfectly balanced by a delicate breeze, the waiter brought me a beautiful, golden-hued glass of Westmalle Tripel. I marveled at the rocky white head that sat atop the effervescent beer, creating a "Belgian lace" with each sip. The freshness of the malt flavors made it seem much crisper than samples I found back in the United States.

Belgian tripel ranges from 7.5 to 9.5% ABV with spicy, fruity and subtle alcohol flavors supported by a grainy Pilsner malt character. While there might be a little upfront sweetness, good examples always finish dry with a moderately bitter balance. Carbonation is high and the body exhibits a medium fullness. While the malt flavors are full of Pilsner goodness, fermentation character is really the centerpiece in this style. Tripel is a complex mix of fruity esters (lemon, orange, grapefruit, pear), phenolic spiciness (pepper, clove) and alcohols. These characteristic flavors and aromas come from fermentation, not from the addition of fruits and spices, although there are some brewers that do use spices. If you go down that road, keep the spice additions to a bare minimum. You might try fresh orange peel, lemongrass, coriander or black peppercorns.

One thing to keep in mind, while tripel has a higher than average alcohol concentration, that does not mean it should be hot or solvent-like. Hot or solvent is never an appropriate beer character regardless of its alcoholic strength. The alcohol should be subtle and warming. In the best examples, the alcohol sneaks up on you only after it has reached your stomach. Many poor examples of this style have a hot alcohol character and finish far too sweet.

The base malt for this style is continental Pilsner malt. Pilsner malt lends a slightly sweet, grainy malt character to the beer. If you can source it, Belgian Pilsner malt is ideal. If you cannot, do not worry, even the Belgian brewers use other continental Pilsner malts. If you are an extract brewer, try to use an extract made from Pilsner malt. While it may seem like it isn't worth the trouble, a beer like this does not have a lot of specialty malts to hide behind, so it is important to use a good quality Pilsner malt extract. Pilsner malt and some table sugar is really all you need, although some brewers add other grains to help differentiate or enhance their beer. Oats, wheat, CaraPils®, aromatic, Vienna, Munich and more show up in various recipes.

I prefer to keep it simple, with no more than one additional malt. Avoid caramel malts, especially those of higher color. Caramel flavor isn't an appropriate character in tripel. If you are going to experiment, focus on the grainy/bready malt flavors instead (such as biscuit, aromatic, Vienna or Munich) and do not add more than 3%. You can experiment with other character grains, but remember this beer is more about the clean Pilsner malt character and fermentation flavors so don't overwhelm them with specialty malts.

Belgian tripel has a medium to medium-light body. Since this is a bigger beer with high starting gravities, all-grain brewers should target a mash temperature around 149 °F (65 °C), which strikes a nice balance between fermentable and non-fermentable sugars. For extract brewers, most light colored extracts are not fermentable enough on their own, but with a portion of simple sugar (table sugar), it should attenuate enough. You will still want to buy an extract that attenu-

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BELGIAN TRIPEL
by the numbers

OG:	1.075–1.085 (18.2–20.5 °P)
FG:	1.008–1.014 (2.0–3.6 °P)
SRM:	4.5–7
IBU:	20–40
ABV:	7.5–9.5%

Strict Observance Tripel

(5 gallons/19 L, all-grain)

OG = 1.081 (19.5 °P)
FG = 1.012 (3.0 °P)
IBU = 34 SRM = 5 ABV = 9.2%

Ingredients

12.4 lb. (5.6 kg) Durst continental Pilsner malt or similar (~1.6 °L)
2.2 lb. (1 kg) cane or beet sugar (0 °L)
3.5 oz. (100 g) Castle or Dingemans aromatic malt (20 °L)
7.6 AAU Tettnang pellet hops (1.9 oz./54 g of 4% alpha acids) (60 min.)
1.4 AAU Czech Saaz pellet hops (0.4 oz./12 g) 3.5% alpha acids) (10 min.)
White Labs WLP530 (Abbey Ale) or Wyeast 3787 (Trappist High Gravity) yeast

Step by Step

I use Durst Pilsner, but Belgian Pilsner malt would be the natural choice for the base malt. The sugar I use is the cheapest grocery store table sugar I can find.

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.063 (15.4 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methionine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl sulfide (DMS) in the finished beer. Add the bittering hops with 60 minutes remaining in the boil. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop addition 10 minutes before shutting off the burner. Chill the wort rapidly to 64 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

You will need three packages of liquid yeast or you can make a 4-L starter from one package. Pitch yeast at 64 °F (18 °C), aerate or oxygenate, and let the temperature rise slowly to 70 °F (21 °C) over the course of one week. Ferment until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but do not rush it. Rack the beer to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Carbonate the beer to approximately three to four volumes and allow it to lager for one month at 45 to 50 °F (7 to 10 °C).

Strict Observance Tripel

(5 gallons/19 L, extract with grains or extract only)

OG = 1.081 (19.5 °P)
FG = 1.012 (3.0 °P)
IBU = 34 SRM = 5 ABV = 9.2%

Ingredients

8.5 lb. (3.9 kg) Pilsner liquid malt extract (~2.3 °L)
2.2 lb. (1 kg) cane or beet sugar (0 °L)
3.5 oz. (100 g) Castle or Dingemans aromatic malt (20 °L)
7.6 AAU Tettnang pellet hops (1.9 oz./54 g of 4% alpha acids) (60 min.)
1.4 AAU Czech Saaz pellet hops (0.4 oz./12 g) 3.5% alpha acids) (10 min.)
White Labs WLP530 (Abbey Ale) or Wyeast 3787 (Trappist High Gravity)

Step by Step

Always choose the freshest extract that fits the beer style. You can consider the aromatic malt optional. You can omit it completely or replace it with a few ounces of Munich malt extract. If you do use the aromatic malt, it is best to try and get it to convert in a very simple mini mash. Mill or coarsely crack the aromatic malt and add it to 6 oz. (177 mL) of 158 °F (70 °C) water. Mix the grains until completely moist, and then do your best to keep the temperature between 150 and 160 °F (66–71 °C) for 30 minutes to one hour. You can do this by setting the container in a larger pot of hot water or wrapping it in a heating pad set on high. The warmer the temperature, the less time it will take to convert the starches, but don't exceed 160 °F (71 °C) to avoid accidentally denaturing the enzymes in the malt. When done the liquid will taste slightly sweet.

Strain out the grains and rinse with warm water. Add the liquid from the mini mash along with enough water and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.069 (16.8 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop addition just before shutting off the burner. Chill the wort rapidly to 64 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

You will need three packages of liquid yeast or you can make a 4-L starter from one package. Pitch yeast at 64 °F (18 °C), aerate or oxygenate, and let the temperature rise slowly to 70 °F (21 °C) over the course of one week. Ferment until the yeast drops clear. Follow the carbonation, conditioning and packaging instructions for the all-grain recipe.

ates well or you will need to make your extract-based wort more fermentable by replacing more of the extract with table or corn sugar. You can use up to 20% table sugar with good results. There is no need to use special sugars. The cheapest grocery store brand is perfect. Beet sugar or cane sugar, it does not matter.

Tripel hop character is usually restrained, with a low to moderate spicy or slightly floral hop aroma and flavor. I prefer to stick with noble hops such as Saaz, Hallertau or Tettnang. Traditionally, breweries also use Styrian Goldings and I think in a pinch other varieties such as Mount Hood, Liberty or Kent Goldings are fine as well. A single, small addition near the end of the boil is about all you can add and still consider the beer a "traditional" example. Many brewers are experimenting with increased aroma and flavor additions, but those experiments may not do well in competition if entered as a classic example.

A good tripel finishes dry, with a firm bitter character. That dryness and bittering comes from alcohols, phenols, carbonation and hops. You can use any of the same hops for bittering and you should strive to balance any residual malt sweetness. The bitterness-to-starting gravity ratio (IBU divided by OG) ranges between 0.25 and 0.5, although most brewers will want to shoot for 0.4 — unless you are getting a very dry finish from fermentation.

There are many great yeast strains for brewing this style, but two of my favorites are White Labs WLP530 (Abbey Ale) and Wyeast 3787 (Trappist High Gravity). Other excellent choices are White Labs WLP500 (Trappist Ale), WLP540 (Abbey IV Ale) yeast, WLP550 (Belgian Ale) yeast and Wyeast 1762 (Abbey II) or 1214 (Belgian Ale) yeast. When selecting yeast, keep in mind that the yeast provide a great deal of the character for this style. The spicy, peppery notes are from yeast-produced phenols and the fruity notes are from yeast-produced esters.

Fermenter height also plays a role in flavor development, with very tall fermenters (like big commercial cylindroconical types) suppressing ester and fusel alcohol production. While you might think this does not apply to your brewing, it does in a roundabout way. Often homebrewers will say, "Brewery X ferments their classic tripel at 88 °F/31 °C, so that is the fermentation temperature I use." The problem is that the shape of the brewery's fermenters may be suppressing the production of esters and fusel alcohols. When you use the same fermentation profile in your relatively short fermenter, you end up with fruit salad dissolved in paint thinner.

With most of these yeasts I recommend pitching at a rate of 0.75 million cells per milliliter per degree Plato (see the pitching rate calculator at www.mrmalty.com for help in calculating this for your beer). Pitch the yeast at a cool temperature and allow 12 to 36 hours for the majority of yeast growth, then ramp up the temperature for the rest of fermentation to ensure good attenuation. For example, pitch the yeast at 64 °F (18 °C) and raise the temperature to 70 °F (21 °C) on the second day or slowly let it rise over the course of one week. You may find a higher or lower temperature gives you the ideal result, so do not be afraid to tweak the parameters until you get it right.

One concern when brewing this style is getting enough attenuation. Many brewers go with lower and lower mash temperatures in an attempt to achieve this, but that is not usually the problem. It isn't that you need to get rid of all the long chain dextrins to make a dry beer. Those dextrins are not sweet and you can have plenty of them present in a nice, dry beer. The important thing is to make sure you ferment out all the simpler sugars completely. If you leave a lot of maltose behind unfermented, then the beer is going to taste sweet, even though it might attenuate well.

If you are having trouble getting a dry beer, one trick that seems to help is waiting until the fermentation is nearly done before adding the simple sugars. Wait until fermentation has started to slow and then add the sugar. If all else fails, you can pitch an actively fermenting lager yeast, which will consume some sugars that the ale yeast will not. Do not add the yeast if they are not in an active fermentation state, because they will just settle out. Make a small starter and wait until the yeast are at high kräusen before you add it to the beer. The lager yeast won't add any real flavor at this late stage, but they will consume some additional sugar.

Oxygen is important to yeast health and is necessary for fermentation to reach terminal gravity in a reasonable amount of time. However, too much or too little oxygen can have unintended consequences, so adding the right amount of oxygen is important. That is difficult for many homebrewers, but at least you should try to measure the amount of oxygen you are adding by timing and flow rate. The amount of oxygen needed is a balancing act. Initially adding oxygen reduces the amount of esters yeast produce, but high levels of oxygen also increase the amount of fusel alcohols, which are also a substrate for ester production. So playing around with the amount of oxygen you add makes a difference in your beer.

If you are using air, there is no chance of over-aerating your wort, but there is a chance of under-aerating. If you are using oxygen with a sintered stone, a good starting point for 5 gallons (19 L) is a flow of 1 L per minute for 1 minute. You might go up or down from there, as experience shows you what is right for your brewing. If you find yourself getting stuck fermentations when brewing high gravity beers, you can add a second dose of oxygen between 12 and 18 hours after pitching. The second dose should be about ½ to ¾ the normal amount of oxygen. This will give the yeast the ability to rebuild their cell membranes after having replicated. The yeast will better tolerate the high alcohol environment ahead with the help of this additional oxygen. BYO

Bohemian Pilsner

BOHEMIAN PILSNER
by the numbers

OG:	1.044–1.056 (11–13.8 °P)
FG:	1.013–1.017 (3.3–4.3 °P)
SRM:	3.5–6
IBU:	35–45
ABV:	4.2–5.4%

Czech or Bohemian-style Pilsner is one of those styles that many new brewers want to learn to brew perfectly. While still crisp like other Pilsner-style beers, Bohemian-style Pilsner has a spicy hop character and a nice, rich, complex maltiness. Bohemian-style Pilsner usually has a bit more malt sweetness than German-style Pilsners, which helps counter the substantial hop bitterness, making it a more balanced, well-rounded beer.

Back in 1842 Bohemian Pilsner was the first clear, pale-colored beer. Even though it was the palest beer back then, Bohemian Pilsner tends to be slightly richer in color than many "modern" Pilsner beers. It ranges from very pale gold to a deep burnished gold. Just as the measure of what is the lightest colored beer style has shifted over time, today there is also a shift occurring when it comes to describing beer styles. What was "high gravity" and "hoppy" just ten or fifteen years ago, means something different on today's beer menu. With the advent and popularity of styles such as Imperial IPA and the hop/alcohol creep that has occurred (mainly on the west coast of the US) over the past few years, the beer that the average brewer or drinker has in mind when you say "hoppy" has shifted. When I started brewing, the material I read often described Bohemian Pilsner as a hoppy beer. While Bohemian Pilsners should have an obvious hop flavor and aroma, don't expect a big, bursty hop aroma or over-the-top flavor. Obvious but integrated is perhaps a better way to describe the hop character of Bohemian Pilsner. The Beer Judge Certification Program (BJCP) style guidelines describe the hop character as a complex and pronounced spicy, floral hop bouquet. That is a good description, but don't think it means a bold hop character. Bohemian Pilsner is rich, but not heavy. Bitter, but not without balance. Hoppy, but without covering up the malt. Clean, but not without fermentation character. The malt character is bready and in balance with the hop flavor, hop aroma, and hop bitterness. Not too bold on either front, these characteristics are just strong enough to be obvious to the drinker. When tasting a well made Bohemian Pilsner, all of these flavors seem to end at the same time in the finish.

I prefer a nice continental Pilsner malt for brewing Bohemian Pilsner. You can use other pale malts if you have no other option, but the light, grainy taste of high quality Pilsner malt is right on target for this style. That is all you need for a great Bohemian Pilsner. You can enhance the malty flavors with a small addition of Vienna, light Munich or melanoidin malt, but keep the percentage to less than 5% of the grain bill. You don't want to overdo the clean, restrained malt flavors of this beer and you never want to add things like caramel malts. The sweetness and flavor of caramel malts add the wrong character. There is one exception, which is head and body forming dextrin malts such as Carapils®. These malts have very little flavor impact, but it is best to keep these between 0 and 10% of the grist.

Extract brewers should use a Pilsner-like malt extract that attenuates in the range of 70% or more. Most light-colored extracts will attenuate fairly well and should be close enough. There are several good Pilsner or pilsner-type extracts out there, so finding one should not be too difficult for most brewers.

Historically, a brewer would use a decoction mash when brewing a Bohemian Pilsner and some breweries still use this time proven method with under-modified malts. While a decoction mash might produce some subtle differences, I find that high quality continental Pilsner malt and a single

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Bohemian Pilsner

(5 gallons/19 L, extract)

OG = 1.056 (13.9 °P)
FG = 1.016 (4.2 °P)
IBU = 40 SRM = 4 ABV = 5.3%

Ingredients

8.0 lb. (3.6 kg) Briess Pilsen liquid malt extract
4.83 AAU Czech Saaz hops (1.38 oz./39 g at 3.5% alpha acids) (60 min.)
5.8 AAU Czech Saaz hops (1.67 oz./47 g at 3.5% alpha acids) (30 min.)
2.9 AAU Czech Saaz hops (0.83 oz./24 g at 3.5% alpha acids) (10 min.)
2.9 AAU Czech Saaz hops (0.83 oz./24 g at 3.5% alpha acid) (0 min.)
White Labs WLP800 (Pilsner Lager), Wyeast 2001 (Urquell) or Fermentis Saflager S-23 yeast

Step by Step

The Briess Pilsen extract contains both Pilsner malt and Carapils®. Use an appropriate amount of dried extract if you can't get the liquid version. If you can't get Briess extract, any fresh, high quality light color extract made from Pilsner malt will work well.

Add enough water to the malt extract to make a pre-boil volume of 6.5 gallons (25 L) and the gravity is 1.044 (10.9 °P). Stir thoroughly to dissolve the extract and bring to a boil. The total wort boil time is 90 minutes. Add the first hop addition with 60 minutes remaining in the boil. The other hop additions are at 30, 10, and zero minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil.

Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is 20 grams of properly rehydrated dry yeast, four packages of liquid yeast or one package of liquid yeast in a 9-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but don't rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation.

Rack the finished beer to a keg and force carbonate or rack to a bottling bucket, add the priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will mellow some of the flavors and improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

Bohemian Pilsner

(5 gallons/19 L, all-grain)

OG = 1.056 (13.9 °P)
FG = 1.016 (4.2 °P)
IBU = 40 SRM = 4 ABV = 5.3%

Ingredients

10.75 lb. (4.8 kg) Durst continental Pilsner malt (or similar) 2 °L
0.75 lb. (340 g) Briess Carapils® malt (or similar) 2 °L
4.83 AAU Czech Saaz hops (1.38 oz./39 g for 3.5% alpha acid) (60 min.)
5.8 AAU Czech Saaz hops (1.67 oz./47 g for 3.5% alpha acid) (30 min.)
2.9 AAU Czech Saaz hops (0.83 oz./24 g of 3.5% alpha acid) (10 min.)
2.9 AAU Czech Saaz hops (0.83 oz./24 g of 3.5% alpha acid) (0 min.)
White Labs WLP800 (Pilsner Lager), Wyeast 2001 (Urquell) or Fermentis Saflager S-23 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.044 (10.9 °P).

The total wort boil time is 90 minutes, which helps reduce the SMM (S-methyl methionine) present in the lightly-kilned Pilsner malt and results in less DMS (Dimethyl Sulfide) in the finished beer. Add the first hop addition with 60 minutes remaining in the boil. The other hop additions are at 30, 10, and zero minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil.

Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is 20 grams of properly rehydrated dry yeast, four packages of liquid yeast or one package of liquid yeast in a 9-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but don't rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation.

Rack the finished beer to a keg and force carbonate or rack to a bottling bucket, add the priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes.

A month or more of cold conditioning at near freezing temperatures will mellow some of the flavors and improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

infusion mash will produce a beer every bit as good as the best commercial examples and even a best of show winner. It is far more important to pay attention to fermentation, sanitation and post-fermentation handling than worrying about decoction. If you've ensured that all of those other aspects of your process are flawless, then maybe it is time to worry about decoctions. Of course, there are still breweries in the Czech Republic that brew their Pilsner with a decoction mash. Tony Powell, Head Brewer at Fish Brewing Company, is also a big proponent of decoction. He reports that on a recent trip to Europe he found a number of brewers still passionate about decoction mash as a critical component of their process. If you want to brew this style in a traditional manner also, go with a double decoction, open fermentation and a minimum of 45 days of lagering.

I like to avoid any work I really don't have to do, so I prefer a single infusion mash. I target a mash temperature range of 152 to 156 °F (67 to 69 °C). If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more body. While this may seem like a fairly high mash temperature, keep in mind that lager yeast will consume more of the tri-saccharide maltotriose than the average ale yeast. While we don't want bock-like body, we do want the fully attenuated beer to still have a fairly full mouthfeel.

I've never been a proponent of messing with brewing water needlessly, but for Bohemian Pilsner I make an exception. Many commercial breweries typically use water with a low mineral content.

You can make a fine example of the style with most water, but low carbonate water helps match the character of the classic examples. You can build your water from scratch, but if your water has moderate alkalinity and you just want to get in the ballpark, try mixing your filtered tap water 50/50 with reverse osmosis or deionized water. If you have highly alkaline water, use a 25/75 mix of tap to reverse osmosis or deionized water. It is important not to use all reverse osmosis or deionized water with no mineral additions, as it lacks the buffering capacity and necessary minerals for all-grain brewing and for ideal fermentation.

In this style, hop flavor and aroma should always be present and should range from low to moderate. I really like using Czech Saaz hops, though sometimes they're hard to source. While many consider Czech Saaz hops a must in this style, you do have some flexibility. The trick is to select hops with that same spicy character. You don't want anything fruity or citrusy. Some decent substitutions are Tettnang, US Saaz, Polish Lublin, Sterling, Sladek, Ultra and Vanguard. If you can't source one of those substitutions and are determined to brew, you can get away with Hallertau, Spalt, Perle or Tradition. It is really the overall impression that matters. The big picture is that you want moderate hop character and a firm bitterness, but both should complement and integrate well with your malt and yeast choices. The balance of bittering versus malt sweetness should always be to the bitter side. You want a firm bittering presence, one that is obvious but not harsh. The bitterness to starting gravity ratio (IBU divided by OG) ranges from 0.6 to 1.0, but I like to target around 0.7 to 0.8.

A good Bohemian Pilsner isn't as clean as your typical German or American Pilsner. There aren't obvious fermentation flaws or anything "unclean" about the beer, but there is a very subtle background note of fermentation-derived compounds that add a certain fullness and interest to the beer. Some may point out the BJCP style guide's acceptance of diacetyl in this style. Yes, I suppose that is acceptable in very small amounts, but I don't think it is something to shoot for. In many cases I believe it may not be present at the brewery, but it is instead a fault that develops in the package with the oxidation of alpha-acetolactate into diacetyl over time.

You can ferment Bohemian Pilsner with almost any lager yeast, though my favorites are White Labs WLP800 (Pilsner Lager) and Wyeast 2001 (Urquell). Other excellent strains are White Labs WLP802 (Czech Budejovice Lager) and Wyeast 2000 (Budvar Lager), 2124 (Bohemian Lager), and 2278 (Czech Pils). You need around 400 billion clean, healthy cells to properly ferment 5 gallons (19 L) of this beer, which is double what you would use for an equivalent strength ale. For a simple, non-stirred starter, one package of liquid yeast in 2.3 gallons (8.7 L) will result in the right amount of yeast. If you're not making a starter, you'll need about four packages of liquid yeast. If you're using dry yeast, use approximately ¾ ounce (20 g) of fresh, properly rehydrated yeast.

When making lagers, I like to get the wort down to 44 °F (7 °C), oxygenate and then pitch the yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) and then I hold this temperature for the remainder of fermentation. This results in a clean lager, with very little diacetyl. The idea is to reduce the diacetyl precursor alpha-acetolactate, which the yeast create during the early phase of fermentation. With a warmer environment, the yeast form more alpha-acetolactate and the finished beer contains more diacetyl. Given time and the proper conditions, active yeast will convert the diacetyl to other compounds with a higher flavor threshold, but the lower the initial amount of diacetyl, the less there will be in the final beer. If you start or ferment your lager warmer, you will need to do a diacetyl rest during the last part of fermentation. To perform a diacetyl rest, warm your beer up about 10 °F (6 °C) until fermentation is complete and the yeast have had a chance to eliminate the diacetyl.

In any case, don't rush things. Good lagers take time and they ferment slower than ales, especially when fermented cold. Once the beer has finished fermenting, a period of lagering for a month or more at near freezing temperatures can improve the beer. BYO

Brown Porter

I am a big fan of all British-style beers. I think the great balance of malt and hop character along with tremendous yeast character makes them all eminently drinkable. The British beer style brown porter has traditionally been problematic for many North American judges and brewers, due to the lack of easy access to fresh commercial examples (especially a decade or more ago).

The problem for judges is that brown porter, like most beers brewed in Britain that are imported to North America, has often traveled long distances under poor conditions and become oxidized by the time it gets served. Oxidation in a caramel-rich beer comes across as a sweet, weird caramel character, not the "paper, wet cardboard" character that new judges are taught to find in light American lager. When I finally developed a recipe and brewed a beer that I felt was on par with the finest commercial examples found in England, few judges were familiar with what a fresh brown porter should taste like. Some scored it high, but it was frustrating to read comments from some of the other judges about a lack of that "special English malt character" when they were mistakenly trying to find oxidation in the beer.

Style-wise, many brewers and judges find brown porter confusing, as they are not sure where it fits among the other dark British beer styles. Brown porter exists in the space between English southern brown ale, mild and robust porter. It is a light brown to dark brown English ale with restrained roast malt characteristics. In comparison, robust porter has a more roast character, while brown porter is often sweeter with more caramel character. While brown porter shares a lot of the same chocolate malt notes as robust porter, it does not have any of the burnt or black malt notes of robust porter; its dark malt character is more chocolate than coffee. The starting gravity on brown porter is often lower than robust porter and higher than mild and brown ales. Brown porter is usually balanced more toward malt sweetness than hop bittering. It should have a caramel and toasty malt character, similar to southern brown ale, but it is bigger and has more roast malt character than southern brown. The hop character is usually low, if any is present at all.

To brew a great all-grain example of this style, start with British pale ale malt as the base. It provides that background rich malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuit-toasty flavors. Some brewers use North American pale ale malt or North American two-row with the addition of some specialty malts, but this will not produce the same beer as using British pale ale malt. Spend the money, make the effort, and use the proper base malt if you want to make an excellent example of the style.

Similarly, extract brewers should make the effort to source an extract made from British pale ale malt. If you end up using North American two-row malt extract, you can try to compensate by partial mashing some additional specialty malts such as Munich, biscuit or Victory®. For a 5-gallon (19-L) batch, use about 5 to 10% of the total base malt.

All-grain brewers should use a single infusion mash. A temperature in the range of 150 to 155 °F (66 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. If you are unsure, a great starting point is 152 °F (67 °C).

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BROWN PORTER
by the numbers

OG:	1.040–1.052 (10.0–12.9 °P)
FG:	1.008–1.014 (2.1–3.6 °P)
SRM:	20–30
IBU:	18–35
ABV:	4.0–5.4%

Brown Porter

(5 gallons/19 L, all-grain)

OG = 1.052 (12.9 °P)
FG = 1.013 (3.4 °P)
IBU = 28 SRM = 26 ABV = 5.1%

Ingredients

8.6 lb. (3.9 kg) Crisp British pale ale malt (or similar English pale ale malt)
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
14.1 oz. (400 g) Thomas Fawcett & Sons brown malt 70 °L (or similar)
8.8 oz. (250 g) Thomas Fawcett & Sons chocolate malt 350 °L
5.5 AAU Fuggle pellet hops (1.1 oz./30 g at 5% alpha acids) (60 min.)
4.8 AAU Kent Goldings pellet hops (0.4 oz./12 g at 5% alpha acids) (10 min.)
White Labs WLP013 London Ale, Wyeast 1028 London Ale or Danstar Nottingham yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22-L) and a gravity of 1.044 (11°P).

The total wort boil time is 60 minutes. Add the first hop addition as soon as the wort reaches a full boil and then start your timer. Add Irish moss or other kettle finings with 15 minutes left in the boil and the second hop addition with 10 minutes left in the boil. Chill the wort to 67 °F (19 °C) and aerate thoroughly.

The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 1.5-liter starter. Ferment at 67 °F (19 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ⅓ of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.

Brown Porter

(5 gallons/19 L, extract with grains)

OG = 1.052 (12.9 °P)
FG = 1.013 (3.4 °P)
IBU = 28 SRM = 26 ABV = 5.1%

Ingredients

5.7 lb. (2.6 kg) Muntons English pale liquid malt extract
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
14.1 oz. (400 g) Thomas Fawcett & Sons brown malt 70 °L (or similar)
8.8 oz. (250 g) Thomas Fawcett & Sons chocolate malt 350 °L
5.5 AAU Fuggle pellet hops (1.1 oz./30 g at 5% alpha acids) (60 min.)
4.8 AAU Kent Goldings pellet hops (0.4 oz./12 g at 5% alpha acids) (10 min.)
White Labs WLP013 London Ale, Wyeast 1028 London Ale or Danstar Nottingham yeast

Step by Step

I use an English pale liquid malt extract for this recipe. If you can't get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead of liquid malt extract (LME).

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1.5 gallons (~6 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22 liters) and a gravity of 1.044 (11°P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 60 minutes. Add the first hop addition as soon as the wort reaches a full boil and then start your timer. Add Irish moss or other kettle finings with 15 minutes left in the boil and the second hop addition with 10 minutes left in the boil. Chill the wort to 67 °F (19 °C) and aerate thoroughly.

The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 1.5-liter starter. Ferment at 67 °F (19 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ⅓ of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.

Fuller's Brewery Brewing Director John Keeling (above). Fuller's brews a classic example of brown porter, London Porter.

While using the proper base malt is important, brown porter also requires a fair amount of specialty malt. For the sweetness and caramel component, consider using 5% to 10% of 40 to 120 °L crystal malt. I prefer to use crystal malts in the 40 to 60 °L range, since they have a more caramel-like flavor. To create the brown color and a chocolate richness, British chocolate malt is an excellent choice, but do not over do it. About 5% is appropriate. Be aware that the chocolate malt from different maltsters can vary substantially in color and flavor. I prefer the lower color chocolate malts, around 350 to 400 °L. The darker malts can be too much like black malt. You want to avoid highly kilned malt (500 to 600 °L), as that gives a character more appropriate to a robust porter or stout. While you can make a really good brown porter with just base, crystal, and chocolate malt, the secret ingredient for an outstanding brown porter is brown malt (5% to 10%). Brown malt provides the nutty, slightly roasty, gentle chocolate background note apparent in some commercial examples. Without it, most recipes lean too heavily upon darker roasted malts and will end up with too much roast character. If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Victory®, biscuit and others are common additions in many recipes, but keep in mind that using too many specialty malts often ends up as a muddled malt character, not a more complex one. Emphasize one or two particular malt characters in your recipe by using two or three grains. Select high quality British specialty malts such as Simpsons or Thomas Fawcett. These malts have a rich malt character, which is complex on its own.

All English-style beer is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger. The bittering level for brown porter has a wide range of 18 to 35 IBU, but you should be shooting for a balance of slightly sweet to slightly bitter. A bitterness to starting gravity ratio (IBU divided by OG) in the range of 0.4 and 0.6 is good. You can skip the late hop additions in this style, but if you want late hop character show some restraint. As a general rule of thumb, add no more late hops than half the amount of bittering hops. This is just a generalization, since using very low or high alpha acid hops makes the equation faulty. One late hop addition, totaling around ½ to ¾ oz. (14 to 21 g) for a 5-gallon (19-L) batch at 15 minutes or later, is plenty. Hop flavor and aroma, when present, is a minor player in this style.

> “Style-wise, many brewers and judges find brown porter confusing, as they are not sure where it fits among the other dark British beer styles. Brown porter exists in the space between English southern brown ale, mild and robust porter. It is a light brown to dark brown English ale with restrained roast malt characteristics.”

Fermentation creates most of the flavor and aroma in many British beers. English-type yeast strains provide a variety of interesting esters and leave some residual sweetness to balance the hop bittering. Many English yeasts attenuate on the lower side (< 70%), but there are some that attenuate quite well (up to 80%). For many British-style beers you have to think about the final balance of the beer. Most British beer styles are near even or on the bitter side. If the beer has a high starting gravity, or you are using lots of specialty grains that add residual sweetness (such as crystal malts), you need to select a more attenuative strain. If you are brewing a beer with a lower starting gravity and/or limited specialty grains, then you want to go with a less attenuative yeast. This is one of the most important things to know about crafting your own British-style recipes. My favorites for brown porter are White Labs WLP013 (London Ale) and Wyeast 1028 (London Ale). They both provide a wonderful ester profile without being excessively fruity, and they attenuate a little more than most English yeasts. Higher attenuation in this case allows you to use more crystal malts for greater caramel flavor without ending up with too much residual malt sweetness.

At lower temperatures (<65 °F/ 18 °C), these yeasts produce a relatively low level of esters and at high temperatures (>70 °F/21 °C) they produce abundant fruity esters and fusel alcohol notes. I start fermentation in the middle of this range (67 °F/19 °C), letting the temperature rise a few degrees over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of diacetyl in the finished beer to a minimum.

Serving British-style beers at cellar temperature, around 52 to 55 °F (11 to 13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the drinker from picking up the interesting fermentation and malt flavors and aromas, so try serving your brown porter above 50 °F (10 °C). Target a carbonation level around 1.5 to 2 volumes of CO_2. BYO

California Common

CALIFORNIA COMMON
by the numbers

OG:	1.048–1.054 (11.9–13.3 °P)
FG:	1.011–1.014 (2.8–3.6 °P)
SRM:	10–14
IBU:	30–45
ABV:	4.5–5.5%

California common is far from common on store shelves and at brewpubs. While you might find a few different examples with some searching, the most well known example of this style is Anchor Steam. During the California gold rush California common, or "steam beer," was the inexpensive beer of the working class. It was found almost everywhere along the West Coast and was brewed by as many as 25 breweries in San Francisco alone. Over the course of more than 100 years, however, steam beer almost completely disappeared. By 1965, the Anchor Brewery of San Francisco was the only brewery still producing steam beer. It was about to close its doors for good when Fritz Maytag came along to save it and the steam beer that they had been brewing since 1896.

California common has a moderately rich malt character and a dry finish. The malt character is obvious, with bread, toast, caramel and slight graininess, but it is never heavy in flavor or aroma. The hop bittering is quite firm, balancing the beer decidedly bitter, but not overwhelmingly so. In the Anchor example, Northern Brewer hops play a big role. They provide a moderate to high level of woody (some people say rustic or minty) flavors and aromas. The hops also help the beer finish dry and firm. Mouthfeel is medium and can have a slightly creamy feel. The carbonation tends to be higher than the average American ale, around three volumes. While the beer has some subtle, light fruity esters from fermentation, it shouldn't be any more than a trace.

The Beer Judge Certification Program (BJCP) uses the classic Anchor Steam to define this style, and that makes it one tough category in which to compete, as the judges are often focused on finding only Anchor Steam. Certainly, you can just try to clone Anchor Steam, but that leaves little room for creativity. It would be better if judges looked for a variant of alt or German lager brewed under late 19th century conditions in California. With that sort of imagination, perhaps there would be more leeway in this category for creativity.

If you do want to brew something similar to the Anchor classic, it is best to focus on a fairly simple recipe. North American two-row or North American pale ale malt plus about 10% of a mid-color crystal malt would be all the grist you would need. Follow that up with Northern Brewer hops, California common yeast from White Labs or Wyeast, fermentation around the mid-60s, and you are all set. Some sources claim that Anchor Steam bears only a passing resemblance to historic steam beer, because historic steam beer was an adjunct-heavy (about a third) beer colored with caramel sugar. While steam beer may have become adjunct-heavy at some later point, it is likely that steam beer during its heyday was all malt, as is Anchor Steam today.

If you want to create your own example of the style, but still do well in competition, the safe thing is to try to play off a characteristic of the Anchor example, such as emphasizing the toasty, biscuit, or caramel character. You can also experiment with different hops, but I would avoid trying to play with the fermentation profile too much, as it is an important part of this style.

Historically, steam beer brewers used the local malt and hops available. In San Francisco, the malt would have been Bay Brewing barley, a six-row barley with plump kernels and low protein said to be similar to North American two-row today. You have several good options for your base malt: North American two-row, North American pale ale, or North American Pilsner malt. North American two-row will give the beer a clean, subtle background malt char-

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Uncommon Common
(5 gallons/19 L, all-grain)

OG = 1.054 (13.3 °P)
FG = 1.016 (4.1 °P)
IBU = 41 SRM = 11 ABV = 5%

Ingredients

9 lb. (4.1 kg) Great Western North American two-row malt (or similar)
17.6 oz. (500 g) Durst Munich malt (or similar)
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
7 oz. (200 g) Briess Victory® malt 28 °L (or similar)
1.75 oz. (50 g) Crisp pale chocolate malt 200 °L (or similar)
5 AAU Northern Brewer hops (0.77 oz./22 g of 6.5% alpha acids) (60 min.)
8 AAU Northern Brewer hops (1.23 oz./35 g of 6.5% alpha acids) (15 min.)
8 AAU Northern Brewer hops (1.23 oz./35 g of 6.5% alpha acids) (1 min.)
White Labs WLP810 (San Francisco Lager) or Wyeast 2112 (California Lager) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 150 °F (66 °C). Hold the mash at 150 °F (66 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.046 (11.4 °P).

The total wort boil time is 60 minutes. Add the bittering hops as soon as the wort starts boiling. Add the second hop addition and Irish moss or other finings with 15 minutes left. The last hop addition goes in 1 minute before the end of the boil. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 2.5 packages of liquid yeast or 1 package of liquid yeast in a 3-liter starter.

Ferment at 62 °F (17 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete within a week, but do not rush it. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

Uncommon Common
(5 gallons/19 L, extract with grains)

OG = 1.054 (13.3 °P)
FG = 1.016 (4.1 °P)
IBU = 41 SRM = 11 ABV = 5%

Ingredients

5.5 lb. (2.5 kg) light liquid malt extract
1 lb. (440 g) Munich liquid malt extract
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
7 oz. (200 g) Briess Victory® malt 28 °L (or similar)
1.75 oz. (50 g) Crisp pale chocolate malt 200 °L (or similar)
5 AAU Northern Brewer hops (0.77 oz./22 g of 6.5% alpha acids) (60 min.)
8 AAU Northern Brewer hops (1.23 oz./35 g of 6.5% alpha acids) (15 min.)
8 AAU Northern Brewer hops (1.23 oz./35 g of 6.5% alpha acids) (1 min.)
White Labs WLP810 (San Francisco Lager) or Wyeast 2112 (California Lager) yeast

Step by Step

Most Munich liquid malt extract (LME) is sold as a blend of Munich and Pilsner or two-row malts in different percentages. I specify 100% Munich LME in my recipe so you will know how much of your blend to use for your brew. When using a blend, replace the Munich extract in the recipe and enough of the two-row extract to match the percentage of the blend. If you want to use 100% Munich extract, the only current supplier I am aware of is Weyermann. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for 15 minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.046 (11.4 °P). Stir thoroughly and bring to a boil.

The total wort boil time is 60 minutes. Add the bittering hops as soon as the wort starts boiling. Add the second hop addition and Irish moss or other finings with 15 minutes left. The last hop addition goes in 1 minute before the end of the boil. Chill the wort rapidly to 62 °F (17°C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 2.5 packages of liquid yeast or 1 package of liquid yeast in a 3-liter starter.

Ferment at 62 °F (17 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete within a week, but do not rush it. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

acter. North American pale ale malt adds a slightly richer background malt character, somewhat of a light bready, biscuit note. Pilsner malt lends a grainy malt character. You can use one of these base malts exclusively or blend them in any proportion you wish. I always thought ⅓ of each would work well for this style, giving it a slightly enhanced biscuit and grainy character, although I have never had a chance to try it. You can also bump up the background malt character of the beer with 10% or so of Munich or Vienna malt, which adds a subtle bready fullness. Extract brewers can use a light-colored extract and blend in English, Munich or Pilsner extract, but it is acceptable and easier to use a light extract with specialty grains instead. All-grain brewers can use a single infusion mash and should target a mash that will leave enough long chain sugars in the beer to help fill out the body. A temperature around 150 to 154 °F (66 to 68 °C) creates wort with a nice balance between fermentable and non-fermentable sugars. Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher temperature when using higher attenuating yeasts or making lower gravity beers. Anchor's mash schedule is a secret, although reportedly it starts at 140 °F (60 °C). Historical steam beer brewers supposedly used a mash temperature of 158 °F (70 °C). If you are trying to copy the Anchor example, I would start at 140 °F (60 °C) and then raise the mash for a rest at 158 °F (70 °C).

The only specialty malt you need for California common is crystal malt. You want to build a gentle but clearly evident caramel flavor and color. Use a mid-color crystal malt between 30 and 70 °L for up to 10% of the grist. If you want to develop more of a toasty/biscuity character, you can add a small percentage (< 5%) of toasted malts, such as Victory®, biscuit or even pale chocolate. Pale chocolate (200–250 °L) imparts a more intense dark toasty note, which I like in this beer. If you use pale chocolate, keep it to a minor addition, around 1%. Stay away from malts darker than pale chocolate or use them in only the tiniest of amounts for color correction, not flavor. You do not want a roast character to come through in the beer. In general, keep the total of all specialty grain additions to less than 15%.

Making a beer similar to Anchor Steam requires Northern Brewer hops. If you want to experiment, avoid highly citrusy or fruity hops as they will overshadow the fermentation character, which is so important to this style. Finding other hop varieties that fit a judge's vision of California common can be tough. You will want to look for varieties that give a woody, earthy, or perhaps a spicy hop character. I have always thought Spalt would work well, with its interesting spicy and somewhat rustic character. You might also experiment with Cluster, Nugget, Perle, Santiam, Tettnanger or Liberty. Historically the hops would most likely have been California-grown Cluster hops.

"Anchor ferments Anchor Steam in large, shallow, open fermenters housed in clean rooms supplied with sterile-filtered San Francisco air."

Go bold on the flavor and aroma hop additions. It shouldn't be overwhelming and turn into an IPA, but the hop character, along with hop bittering, should be full and readily apparent to the drinker. For flavor and aroma, add two or three later additions around ¼ to ½ oz. per gallon (1 to 3 g/L). You can go lighter or heavier, just keep in mind the overall character you are trying to build. Target a bitterness-to-starting gravity ratio (IBU divided by OG) of 0.6 to 1.0.

While the original steam beer brewers did not have refrigeration, they did have a cool marine environment and took advantage of it by using large, very shallow, open fermenters to hold down fermentation temperatures. They also selected a yeast that gave good results at warmer temperatures. So it is no surprise that the key to making a great California common is using the proper yeast at the proper temperature. This will give the beer just the right profile, with a subtle fruity note and a dry finish. Many people wonder if the California common and altbier yeasts available today are really lager or ale yeasts. Chris White at White Labs told me that their WLP810 (San Francisco Lager) strain is a true lager yeast and that their alt strains are true ale yeasts. Even though most brewers today choose to ferment California common with a lager yeast, that does not mean historically the beers were fermented with a true lager strain. Perhaps an alt or Kölsch yeast would work well, given the possibility that altbier brewing was the genesis for the style. Some recipes suggest using various lager yeasts, but those that I have tried in the past just do not seem to produce the right character as well as a bit too much sulfur. The best choice if you want to produce something like Anchor Steam is White Labs WLP810 (San Francisco Lager) or Wyeast 2112 (California Lager). Anchor ferments Anchor Steam in large, shallow, open fermenters housed in clean rooms supplied with sterile-filtered San Francisco air. The special fermenters allow the heat of fermentation to dissipate and hold the beer temperature lower than a tall cylindroconical fermenter under the same conditions. The few times I have looked into the fermentation room, the ambient temperature was in the range of 64 to 67 °F (18 to 19 °C). You might experiment with open fermentation as well, but when using a homebrew-sized closed fermenter, I find a fermentation temperature of 62 to 64°F (17 to 18°C) gives the best result. Follow that up with a month of cold conditioning and carbonation approaching three volumes and it will help you come a little closer to matching that wonderful Anchor classic. BYO

Cream Ale

My friends know I am fond of saying that I love every beer style if the example I am drinking is really well made, and the same is true for cream ale. For this style, however, I need to add one other caveat, which is the right drinking situation. I must be in the mood for something light and refreshing, but with alcohol as well. For me, the best occasion is when I have some sort of mind numbing chore to complete in the heat of the day — like pulling weeds. I used to think that cream ale was a "lawnmower" beer, but common sense will quickly tell you that power tools and alcohol do not mix. It is harder, however, to injure yourself pulling a few weeds.

Cream ale is a crisp, clean, dry beer, like an American standard lager with a little too much malt presence. I am surprised at the number of times I have had people ask about adding vanilla to a cream ale. Cream ale has absolutely no relationship to cream soda. Cream ale should never be sweet and it should never have vanilla flavor. Think of it as being similar to a mass market American-style lager, but made with ale yeast.

Cream ale should always be clean, crisp and refreshing. This is a moderate alcohol beer (4.2 to 5.6% ABV) with a light to medium body and medium to high carbonation. Appearance ranges from pale straw to gold with brilliant clarity. Good examples will exhibit a slight malt and hop character. Hop flavor and aroma are always low and should not overwhelm the malt character.

The grist for brewing this style often consists of either domestic two-row, six-row or Pilsner malt, and either corn or rice as an adjunct. You want the beer to have a subtle malty note. One trick that I find useful in this style is using half domestic two-row and half continental Pilsner malt. Pilsner malt lends a slightly sweet, grainy malt character to a beer. If you are an extract brewer, use an extract that includes at least some Pilsner malt. A beer like this does not have specialty malts to hide behind, so little tricks like this can stand out in a crowd. When all the other beers at the table have minimal malt character, the one with a touch of grainy flavor and aroma stands out as maltier. I would not bother using six-row malt, as long as you are not using a very high level of adjuncts (>30%).

About 20 to 30% of the fermentable sugars should be made from non-malt sources. Some brewers prefer to use a corn-based adjunct, although almost any non-malt adjunct will do. I prefer to use rice, as it has a very clean flavor. However, if you are trying to impress some judges, you might want to stick with corn. The Beer Judge Certification Program (BJCP) style guide says that, "A sweet, corn-like aroma and low levels of dimethyl sulfide (DMS)are commonly found."

Unfortunately, some judges will read "commonly found" as a requirement for corn and DMS. If you are in such a situation, you might want to stick with using corn for your adjunct. You can also use simple sugar to help get a crisp, dry finish. Simple sugar, such as table sugar, will ferment more completely than rice or corn converted in your mash or rice based syrups (which are mostly maltose). If your cream ale does not ferment dry enough, consider replacing 10% of the malt with simple sugar the next time you brew your cream ale. Hold the total adjunct use to 30% or less of the fermentables. A good target for this style is around 20%.

Many brewers want to add specialty grains to this style, such as crystal or Munich malts, but you should not add specialty grains as they can add too much sweetness or too much malt character for this style. If you are not getting enough malt character from North American two-row and

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CREAM ALE
by the numbers

OG:	1.042–1.055 (10.5–13.6 °P)
FG:	1.006–1.012 (1.5–3.1 °P)
SRM:	2.5–5
IBU:	15–20
ABV:	4.2–5.6%

Weed Puller Cream Ale
(5 gallons/19 L, all-grain)

OG = 1.050 (12.4 °P)
FG = 1.009 (2.2 °P)
IBU = 18 SRM = 3 ABV = 5.4%

Ingredients

4.41 lb. (2 kg) Best Malz Pilsner malt (2 °L) (or similar)
4.41 lb. (2 kg) Great Western 2-row malt (2 °L) (or similar)
1.76 lb. (800 g) flaked rice (0 °L)
3.36 AAU Liberty pellet hops (0.84 oz./24 g at 4% alpha acids) (60 min.)
1.68 AAU Liberty pellet hops (0.42 oz./12 g at 4% alpha acids) (1 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. You might want to extend your mash time, due to the lower mash temperature. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.039 (9.7 °P).

The total boil time will be 90 minutes. Add the bittering hops 30 minutes after the wort starts boiling. Add Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop additions just one minute before shutting off the burner. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Use nine grams of properly rehydrated dry yeast, two liquid yeast packages, or make a yeast starter. Ferment at 65 °F (18 °C). When fermentation is finished, carbonate the beer to approximately 2.5 volumes.

Weed Puller Cream Ale
(5 gallons/19 L, extract)

OG = 1.050 (12.4 °P)
FG = 1.009 (2.2 °P)
IBU = 18 SRM =3 ABV = 5.4%

Ingredients

5.84 lb. (2.65 kg) Pilsner liquid malt extract (2 °L)
1.14 lb. (520 g) rice syrup (0 °L)
3.36 AAU Liberty pellet hops (0.84 oz./24 g at 4% alpha acids) (60 min.)
1.68 AAU Liberty pellet hops (0.42 oz./12 g at 4% alpha acids) (1 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

I use the lightest colored extract available at my local homebrew shop to brew cream ales, but feel free to substitute any high quality malt extract of a similar flavor and color from a different supplier. Always be sure to choose the freshest malt extract that fits the beer style. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead, since it does not oxidize nearly as fast and tends to be fresher.

Mix enough water with the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.043 (10.6 °P). Stir the mixture thoroughly to help dissolve the extract and bring it to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. Add the Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop additions just one minute before shutting off the burner. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Use nine grams of properly rehydrated dry yeast, two liquid yeast packages, or make a yeast starter. Ferment at 65 °F (18 °C). When fermentation is finished, carbonate the beer to approximately 2.5 volumes.

Anderson Valley Brewing Company in Boonville, California (Mendocino County) brews Summer Solstice — a commercial example of cream ale.

Pilsner malt, then you should review your fermentation. Poor fermentation will result in a beer that is "flabby" and it masks the character of the grain. The same can happen with yeast strains, as some will leave more malt character behind than others. Keep in mind that high quality malt is only apparent when you have high quality fermentation. This beer is more about the clean malt and fermentation flavors so don't hide that with specialty malts. Almost any amount of specialty grain is too much in this style.

Cream ale has a light to medium body. All-grain brewers should target a mash temperature around 149 °F (65 °C), which results in a lower concentration of non-fermentable sugars. For extract brewers, most light colored extracts will ferment out to the right level. If your extract does not attenuate enough, you should first review your fermentation parameters. If everything checks out, on your next batch of cream ale, experiment with replacing a portion of the malt extract with simple sugar.

Hop character in cream ale is restrained, usually no more than low levels with a floral aroma and flavor, but almost any pleasant hop flavor and aroma will work well. The important thing is to not allow the hop character to overwhelm the malt character.

Keep everything restrained and keep everything in balance. It can be too easy to overwhelm the malt and fermentation character with hops. You want the drinker to get a hint of malt character in there, along with the hop bittering, flavor and aroma. A bittering addition at the beginning of the boil is all that is required of this style, but you can add some late hops if you do not overdo it. One small late addition of ¼ to ½ ounce (7 to 14 g) per 5-gallon (19-L) batch is plenty.

Bittering ranges from low to medium, although medium is a bit generous for most good examples. Perhaps in the driest examples of cream ale the bittering may seem at medium levels. Remember, the goal is to keep the beer refreshing, crisp and highly drinkable. Too much or too little bitterness or sweetness can impact drinkability and send the beer into a different style. The bitterness-to-starting gravity ratio (IBU divided by OG) ranges between 0.3 and 0.4.

> "Cream ale is a crisp, clean, dry beer, like an American standard lager with a little too much malt presence. I am surprised at the number of times I have had people ask about adding vanilla to a cream ale. Cream ale has absolutely no relationship to cream soda. Cream ale should never be sweet and it should never have vanilla flavor."

The right fermentation character for this style is clean and neutral ale fermentation. While all fermentation results in some ester production, even clean ales have more esters than most lagers. That is the key difference here. Cream ale is not quite like a clean lager, but somewhere in between lager and ale. Most American-type yeast strains should give acceptable results. I prefer the clean character of White Labs WLP001 (California Ale) and Wyeast 1056 (American Ale). An interesting alternative to those strains is to use a Kölsch yeast. This can produce a touch of sulfur and that adds a little lager-like character to the beer without it seeming like a lager. What about lager yeasts? Well, this is an ale, not a lager. If you ferment the same wort with a good American lager yeast, it should turn out very similar to an American lager. If you ferment it with a lager yeast that leaves more malt character, then it might pass as an under-hopped German lager. Sure, there are commercial examples produced with lager yeast, but I wonder if the fine distinction between ale and lager is sometimes lost on some folks.

The Genesee Brewing Company in Rochester, New York. Genesee brews a cream ale that is one of the most commonly recognized examples of the style.

Whatever yeast you use, remember that your fermentation conditions affect what flavors and aromas the yeast produce. Pitching rate, oxygen level, nutrients and temperature are like dials on your control panel of fermentation flavor. Starting with a healthy pitch of yeast, aerating or oxygenating and controlling temperatures are the keys to getting a well attenuated beer that allows the subtle malt flavors to shine through. When using a clean American yeast like White Labs WLP001 (California Ale) and Wyeast 1056 (American Ale), I like to ferment in the mid-60s °F (~ 18 °C). Lower temperatures (and environmental stress in general) tends to produce more sulfur in most yeasts, so watch that you do not push fermentation temperatures too low. You may find a higher or lower temperature gives you the ideal result, so do not be afraid to tweak the parameters until you get it right. BYO

Dry Stout

DRY STOUT
by the numbers

OG: . . . .1.036–1.050 (9.1–12.4 °P)
FG: . . . . . .1.007–1.011 (1.8–2.8 °P)
SRM: 25–40
IBU: 30–45
ABV: 4.0–5.0%

Several months ago I was enjoying an evening out at a local brew pub with several non-beer geek friends. One friend asked me what I would recommend from the pub's beer list. I began describing the various beers and what they might expect from each. And then it happened again. When I began to describe the pub's award-winning dry stout, he said, "Oh I don't like dark beers. They are too thick and have too much alcohol." Then another person chimed in, "I want something with a lot of flavor, but not so much alcohol."

Argh! I find it frustrating when people speak of all stouts as if they were the equivalent of used motor oil with enough alcohol to launch a rocket. Not all stouts are big and heavy and misconceptions keep a lot of people from trying some wonderful beers. While some stout substyles do have significant levels of alcohol and can be full-bodied, dry stout is usually a lower alcohol beer, with a dry finish and light body that makes it easy to consume. It is a great choice when you want to have a few flavorful beers without being overwhelmed by alcohol.

Dry stout is a very dark, roasty, bitter, and sometimes creamy ale. The commercial example most people know is Guinness Draught (4.1 to 4.3% ABV). It is a fine example of the style, right in the middle of the road as compared to some other commonly available dry stouts, such as Murphy's (4 % ABV) and Beamish (4.1% ABV). Like all dry stouts, Guinness Draught is a fairly low gravity, low alcohol, and low body beer with a relatively high level of hop bittering. It is dry and bitter, but easy to drink by the pint because of its dryness, low alcohol and low carbonation.

Guinness starts with an aroma full of coffee and chocolate. The ester levels are fairly low, with some fruity/grape notes. The flavor is rich with coffee, chocolate, and a touch of pear/grape fruit esters. Overall, it is far more bitter than Murphy's. The finish is sharp and dry with a long coffee and bittersweet chocolate finish.

Murphy's is less roasty than Guinness and is sweeter. The aroma is much fruitier than either Guinness or Beamish, with apples and pears mixed in with moderate coffee notes. The flavor, like all good dry stouts, starts with coffee. It continues with a little bit of cocoa and more fruity esters.

Beamish is my favorite of the big three. It has a touch more acrid roast character than Guinness, almost to the point where it is biting. Guinness is less acrid, more chocolatey. Beamish has minimal fruity esters, slightly more than Guinness, but less than Murphy's. It also has something in the flavor and aroma that neither Guinness nor Murphy's display — hops. The floral hop character is moderate and is obvious alongside the coffee, chocolate and slight fruitiness. While Beamish has more roast notes than Guinness and slightly more sweetness up front, in the end it has a drier finish.

Much has been made of Guinness sourness or Guinness "twang." It is said that Guinness adds a portion of soured beer back to achieve that balance. To my palate, Beamish has as much "twang" as Guinness and reportedly they don't add soured beer. I prefer to skip any sort of sour beer, sour wort, or acid malt addition. If you feel the beer you're making needs something sour, you can experiment with those methods.

The roasted character of this style comes primarily from highly kilned, unmalted barley. There is conflicting information out there about the flavor difference between roasted malt and roasted barley, with some sources saying there is no difference and others saying that roasted malt provides more coffee-like character, but it is more acrid too. The differ-

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Guinness-Style Dry Stout

(5 gallons/19 L, all-grain)

OG = 1.041 (10.3 °P)
FG = 1.010 (2.6 °P)
IBU = 41 SRM = 44 ABV = 4.1%

Ingredients

6.25 lb. (2.83 kg) Crisp British pale ale malt or similar Maris Otter malt
1.75 lb. (794 g) Great Western flaked barley
14.0 oz. (397 g) Great Western roasted barley (500 °L) (crushed to powder)
8.35 AAU Kent Golding pellet hops (1.67 oz./47 g at 5% alpha acids) (60 min.)
White Labs WLP004 (Irish Ale), Wyeast 1084 (Irish Ale) or Fermentis Safale US-05 yeast

Step by Step

Crush the roasted barley very fine. Run it through a coffee mill or use a rolling pin to turn it almost to dust. That is critical to getting the right flavor and color with this recipe. Mill the remaining grains as normal and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 120 °F (49 °C). Hold the mash at 120 °F (49 °C) for 15 minutes then raise the temperature to 150 °F (66 °C) until enzymatic conversion is complete. Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.032 (8.1 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate.

Ferment at 65 °F (18 °C). Slowly raise the temperature during the final ⅓ of fermentation by 6 °F (3 °C) to reduce diacetyl levels in the beer. When finished, carbonate the beer to approximately 1 to 1.5 volumes and serve at 52 to 55 °F (11 to 13 °C).

Extract With Grains Option:

Replace the British pale ale malt and flaked barley with 5.25 lb. (2.38 kg) Muntons pale ale liquid malt extract. Follow the remainder of the all-grain recipe.

Partial Mash Option:

The recipe becomes 1 lb. (0.45 kg) British pale ale malt, 1.75 lb. (794 g) flaked barley, 14 oz. (397 g) roasted barley, and 3.5 lb. (1.58 kg) Muntons pale ale liquid malt extract. Place the crushed grains and flaked barley in a steeping bag. Heat 5 quarts (~ 5 L) to 160 °F (71 °C), add grain bag, and let steep for approximately one hour. Rinse out the grains and proceed as normal, adding the extract and water to the steeping liquour. Follow the remaining all-grain recipe.

Beamish-Style Dry Stout

(5 gallons/19 L, all-grain)

OG = 1.041 (10.2 °P)
FG = 1.009 (2.4 °P)
IBU = 40 SRM = 50 ABV = 4.1%

Ingredients

6.0 lb. (2.72 kg) Crisp British pale ale malt or similar malt made from Maris Otter
1.75 lb. (794 g) Great Western flaked barley
17.0 oz. (482 g) Great Western roasted barley (500 °L) (crushed)
7.6 AAU Challenger pellet hops (0.95 oz./27 g at 8% alpha acids) (60 min.)
2.5 AAU Kent Golding pellet hops (0.5 oz./14 g at 5% alpha acids) (15 min.)
White Labs WLP004 (Irish Ale), Wyeast 1084 (Irish Ale) or Fermentis Safale US-05 yeast

Step by Step

Crush the roasted barley very fine. Run it through a coffee mill or use a rolling pin to turn it almost to dust. That is critical to getting the right flavor and color with this recipe. Mill the remaining grains as normal and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 120 °F (49 °C). Hold the mash at 120 °F (49 °C) for 15 minutes then raise the temperature to 148 °F (64 °C) until enzymatic conversion is complete. Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.032 (8 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings and the last hop addition with 15 minutes left in the boil. Chill the wort rapidly to 69 °F (21 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Ferment at 69 °F (21 °C). Slowly raise the temperature during the final ⅓ of fermentation by 6 °F (3 °C) to reduce diacetyl levels in the beer. When finished, carbonate the beer to approximately 1 to 1.5 volumes and serve at 52 to 55 °F (11 to 13 °C).

Extract With Grains Option:

Reduce the amount of British pale ale malt to 1.0 lb. (0.45 kg) and omit the flaked barley. Add 1.25 lbs. (0.57 kg) of light dried malt extract and 3.3 lbs. (1.5 kg) of a British pale ale liquid malt extract (such as Muntons). Steep crushed grains at 148 °F (64 °C) for 60 minutes. Add dried malt extract to "grain tea," add water to make at least 3 gallons (11 L) and boil 60 minutes. Add liquid malt extract late in boil. Chill and follow remaining instructions in the all-grain recipe.

ence is reportedly because the malted grain forms far more melanoidins when kilned. I've always been in the camp that believes there is a difference between the two, and when making a dry beer, it is best to avoid the more acrid roasted malt and use only roasted barley.

Optionally, a touch of a lighter roasted malt, such as chocolate (350–450 °L) can add a nice complexity to the roast character (more nutty/chocolate). The combination of dark malts in this style should add up to around 10% of the grist, give or take a couple points. While caramel malts are appropriate for some of the bigger stout styles, especially those with a sweeter finish, it is a mistake to include large amounts of caramel malt in a dry stout recipe. Caramel malts add non-fermentable sugar and caramel flavor, which negatively affect the dryness of the beer. If you're trying to make a sweeter version, similar to Murphy's, then perhaps a tiny bit of crystal malt is acceptable. You can also increase the perception of sweetness by reducing the amount of highly kilned grain, reducing hop bitterness, or by using a less attenuative yeast.

There is also some debate over the role of unmalted barley in dry stout, with one side saying it is important to the mouthfeel of the beer and the other saying it is used by the breweries for cost efficiency only. If you're an all-grain brewer, it is simple enough to use flaked unmalted barley for a portion of your grist. If you're an extract brewer, you can skip the flaked barley, otherwise you should convert it via a partial mash.

I prefer British pale ale malt as the base for dry stout. It provides a nice background biscuit-like malt character. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average North American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors. If you're extract brewing, use an extract made from British pale ale malt. Look for products labeled English pale, Maris Otter, or British-style malt extract.

Dry stout generally has a light body, some would say medium-light. Commercial breweries use all sorts of mash schedules, with the goal of converting the flaked barley and making a fermentable wort. You might hold the mash for a beta glucan rest, then a protein rest, and finally a saccharification rest when making a dry stout. I often combine the beta glucan rest and the protein rest at a temperature of 120 °F (49 °C) to simplify things. If you prefer a single infusion mash, a temperature around 150 °F (65 °C) strikes the proper balance between fermentable and non-fermentable sugars. I've read that Beamish uses a rest temperature of 143 °F (62 °C), so it seems that there is leeway for the saccharification rest. For extract brewers, most light colored extracts will get you fairly close. If not, you can make your extract-based wort more fermentable by replacing a portion of your extract with table or corn sugar or by doing a partial mash with some two-row malt and your extract.

Some brewers report various problems with the mash when making dry stout. One thing to keep an eye on is the mash pH as the dark grains can push the mash below 5.2 pH. If your water is low in alkalinity, you might need to tweak your water chemistry a bit to deal with the acidity of the dark malt. Adding a small amount of calcium carbonate and sodium bicarbonate to the mash to correct the pH is all it takes. Don't try to replicate the water of Dublin or anything like that. In more locations than not, the water you have is fine for brewing dry stout.

Another common issue is the recirculation or runoff of the mash. Unmalted, flaked barley can be gummy (especially if you do not perform a beta glucan rest). To make matters worse, when a grain is highly kilned, it becomes brittle and when milled it produces a much higher percentage of flour and stuck mashes.

A good friend of mine believes in cold steeping his roasted malt. He adds the crushed malt to cold water the day prior and then adds the roasty liquor to the boil kettle as needed. He tells me that this method reduces any roasted grain harshness. Personally, I've not had a harshness issue, but this might be a useful tool in your arsenal if you wish to give it a try.

It is the highly kilned grain along with substantial hop bitterness that enhances the dry finish of this style. Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.9 and 1.1. Normally, a single addition at 60 minutes is all you need. If you want a beer with some hop character, along the lines of Beamish, then a moderate later addition, say ½ ounce (14 g) around 20 minutes or later is appropriate. Hop choice for bittering and flavor is fairly flexible. Kent Goldings, Fuggle, Challenger, Target, Perle, Magnum all work well. Don't use any citrusy or catty American-type hops.

Two great yeasts for brewing this style are White Labs WLP004 (Irish Ale) and Wyeast 1084 (Irish Ale). Irish ale yeast provides the right low-ester profile but is only moderately attenuative. You'll need to pitch the proper amount of clean, healthy yeast and keep a close eye on fermentation temperatures to ensure good attenuation. As an alternative, you can use a neutral ale yeast with higher attenuation, such as White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 with acceptable results. For a more fruity interpretation, similar to Murphy's, ferment warmer with the Irish ale yeast or switch to an English-style ale yeast. White Labs WLP007 Dry English or Wyeast 1098 British Ale work well. Some commercial breweries have been known to use lager yeasts for some stout styles. Whatever you use, pick a yeast that will finish dry enough for the style.

The final step in brewing a great example of this style is proper carbonation. Too much CO_2 can make smaller beers seem thin and harsh. Carbonation of 1 to 1.5 volumes and a serving temperature of 52 to 55 °F (11 to 13 °C) is ideal. If you really want to go stout crazy, you can serve your dry stout with beer gas (a nitrogen/CO_2 mix) on a stout faucet. BYO

English Barleywine

One of the classic examples of English barleywine is Thomas Hardy's Ale. Some years ago a friend invited me to a vertical tasting of Thomas Hardy's Ale. He had been purchasing and cellaring each vintage since 1988. More than a dozen years later, he was ready to see how each had matured over time.

The barleywine was a 12% ABV, bottle-conditioned beer, and many people claimed that it should be laid down for five to ten years or more before drinking. I was thrilled at the opportunity to taste it, since the beers were, at that time, already quite rare. Some of the later vintages were very good, showing the complexity that develops as the alcohols and malts oxidize and chemically change over the years. The older samples had already become Madeira-like with heavy oxidation and some of the oldest had some sour notes. I found the experience very educational, learning that some beers age better than others and it has almost as much to do with the brewer and the ingredients as it does the storage conditions. It also made me appreciate English barleywine and how complex it can become with a little age.

English barleywine is rich and strong, with a focus on malty richness and complex fermentation and aging flavors. Young examples start out with more bready or biscuit characteristics, with moderate hop character and young fruity esters. As they age, the malt character takes on more sweet caramel notes and the ester profile takes on some dried and dark fruit notes. While alcohol is present and warming, it is never hot or harsh. The same could be said about the hop bittering and hop character. While the bittering is firm enough to balance any malt sweetness, it is never sharp or biting. Hop character can be moderate in younger examples, but as the beer ages, much of the character fades to a background note. The color of the beer should range from rich gold to very dark amber and the mouthfeel should be full and rich, with a smooth texture.

To brew a great example of this style, start with British pale ale malt as the base. It provides that background biscuit-like malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors. Some brewers use North American pale ale malt or North American two-row with the addition of 5 to 10% Munich malt if they can't source British pale ale malt. This will not produce the same beer as a British pale ale malt, but it can produce a pleasant malt background.

Extract brewers should make the effort to source an extract made from British pale ale malt. If you use North American two-row malt extract, you must compensate by partial mashing some additional specialty malts such as Munich, biscuit or Victory®. For a 5-gallon (19-L) batch, use about 5 to 10% of the total base malt.

All-grain brewers should use an infusion mash. A temperature in the range of 149 to 154 °F (65 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. A great starting point is 152 °F (67 °C).

While English barleywine is a rich, malty beer, much of that comes from the base malt and extended boiling times. Do not overload your beer with lots of crystal malts: 5% is a good amount and 10% is about the maximum. I prefer to use darker color crystal malts (60 to 150° L), which add rich color, as well as some dark caramel, toasty, roasted, and raisin

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ENGLISH BARLEYWINE
by the numbers

OG:	1.080–1.120 (19.3–28.1 °P)
FG:	1.018–1.030 (4.6–7.6 °P)
SRM:	8–22
IBU:	35–70
ABV:	8.0–12.0%

English Barleywine
(5 gallons/19 L, all-grain)

OG = 1.100 (23.8 °P)
FG = 1.024 (6.0 °P)
IBU = 63 SRM = 16
ABV = 10.2%

Ingredients

19.3 lb. (8.75 kg) Crisp English pale ale malt (or similar)
8.8 oz. (250 g) Franco-Belges caramel Munich malt (60 °L) (or similar)
8.8 oz. (250 g) Great Western crystal malt (120 °L) (or similar)
13.75 AAU Target pellet hops (1.25 oz./36 g at 11% alpha acids) (60 min.)
2.5 AAU Kent Goldings pellet hops (0.5 oz./14 g at 5% alpha acids) (15 min.)
2.5 AAU Kent Goldings pellet hops (0.5 oz./14 g at 5% alpha acids) (0 min.)
White Labs WLP013 (London Ale), Wyeast 1028 (London Ale) or Danstar Nottingham yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 150 °F (66 °C). Hold the mash at 150 °F (66 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 7.1 gallons (27 L) and the gravity is 1.070 (17.1 °P). If you should come up short on the pre-boil gravity, top it off with some pale malt extract.

The total wort boil time is 120 minutes. This helps concentrate the wort and aids in the development of flavor compounds. The first hop addition comes with 60 minutes remaining in the boil. Add the Irish moss or other kettle finings and the second hop addition with 15 minutes left in the boil. Add the last hop addition at flame out.

Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 17 grams of properly rehydrated dry yeast, three packages of liquid yeast, or one package of liquid yeast in a 6-liter starter. Ferment at 68 °F (20 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last 1/3 of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.

English Barleywine
(5 gallons/19 L, extract with grains)

OG = 1.100 (23.8 °P)
FG = 1.024 (6.0 °P)
IBU = 63 SRM = 16
ABV = 10.2%

Ingredients

12.8 lb. (5.82 kg) Muntons English pale liquid malt extract
8.8 oz. (250 g) Franco-Belges caramel Munich malt (60 °L) (or similar)
8.8 oz. (250 g) Great Western crystal malt (120 °L) (or similar)
13.75 AAU Target pellet hops (1.25 oz./36 g at 11% alpha acids) (60 min.)
2.5 AAU Kent Goldings pellet hops (0.5 oz./14 g at 5% alpha acids) (15 min.)
2.5 AAU Kent Goldings pellet hops (0.5 oz./14 g at 5% alpha acids) (0 min.)
White Labs WLP013 (London Ale), Wyeast 1028 (London Ale) or Danstar Nottingham yeast

Step by Step

I use an English pale liquid malt extract, so feel free to substitute any high quality malt extract of a similar flavor and color from a different supplier. Always be sure to choose the freshest malt extract that fits the beer style. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead, since it does not oxidize nearly as fast and tends to be fresher..

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 7.1 gallons (27 liters) and a gravity of 1.070 (17.1 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 120 minutes. This helps concentrate the wort and aids in the development of flavor compounds. The first hop addition comes with 60 minutes remaining in the boil. Add the Irish moss or other kettle finings and the second hop addition with 15 minutes left in the boil. Add the last hop addition at flame out. Chill the wort to 68 °F (20 °C) and aerate thoroughly.

Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 17 grams of properly rehydrated dry yeast, three packages of liquid yeast, or one package of liquid yeast in a 6-liter starter. Ferment at 68 °F (20 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ⅓ of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.

flavors. Lighter color crystal malts (10 to 40 °L) add sweeter caramel notes, which can make a big beer seem more candy-like.

If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Victory®, biscuit and others are common additions in many recipes, but restraint is important so that the beer does not become saturated with non-fermentable dextrins and cloying flavors. In general, keep the total of all specialty grain additions to less than 15% of an all-grain grist. Avoid more than small additions of highly kilned malts, as roasted flavors are not appropriate. Color in this style comes mainly from crystal malts and longer boil times. If you want to develop more color and more melanoidin-based flavors and aromas, start with a larger pre-boil volume so you can boil the wort for two hours or more. This develops a certain character that is not possible by using grain additions alone.

English-style beer is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger. The bittering level for English barleywine is in the range of 35 to 70 IBU. You want enough hop bitterness to balance any residual sweetness, without overwhelming the malt background. There are many factors at play in the final impression of bitterness for the drinker. The starting and final gravities, the character malts selected, the type of base malt, the yeast strain, the pitching rate, and even the yeast cell size all have an impact on the perceived bittering. One additional factor is the amount of time before drinking. You may want to shoot a tiny bit higher on bittering if your expected drinking date is a year or more out. A bitterness-to-starting gravity ratio (IBU divided by OG) between 0.4 and 0.8, should be close. I tend to target around 0.6 to 0.7, because I expect to drink the beer after a period of aging. As a general rule of thumb in determining late hop amounts, include an amount equal to the amount of bittering hops. This is just a generalization, since using very low or high alpha acid hops makes the equation faulty. One or two late hop additions, totaling around 1 to 2 oz (28 to 57 g) for a 5 gallon (19 L) batch at 20 minutes or later, should be about right. Keep in mind hop flavor and aroma should not overwhelm the malt character even when the beer is young.

> "To brew a great example of this style, start with British pale ale malt as the base. It provides that background biscuit-like malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors."

Fermentation creates most of the flavor and aroma in many British beers. "English" yeast strains provide a variety of interesting esters and leave some residual sweetness to balance a bitter beer. Many English yeasts tend to attenuate on the lower side (< 70%), but for an English barleywine you want to choose one of the more attenuative English yeasts (> 70%). While you should expect some malt sweetness in the finish, using a low-attenuating yeast in a big beer will result in a beer that is too heavy and sweet. My favorites for this style are White Labs WLP013 (London Ale) and Wyeast 1028 (London Ale) yeast. They both provide a wonderful ester profile without being excessively fruity, and they attenuate a little more than most English yeasts. If you like to experiment with different yeasts, try to select English yeasts that attenuate in the mid 70s percent or higher. If you prefer dry yeast, Danstar Nottingham should produce acceptable results.

At lower temperatures (<65 °F/ 18 °C), these yeasts produce a relatively low level of esters and at high temperatures (>70 °F/21°C) they produce abundant fruity esters and fusel alcohol notes. I start fermentation in the middle of this range (68 °F/ 20 °C), letting the temperature rise a few degrees, slowly over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of diacetyl in the finished beer to a minimum. If your situation restricts you to using less attenuative yeast, you will need to take steps to ensure enough attenuation. For barleywine you can lower the mash temperature or replace a portion of the base malt with simple sugar to help dry out the final beer.

Serving English barleywine at cellar temperature, around 52 to 55 °F (11 to 13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the drinker from picking up the interesting fermentation and malt flavors and aromas of this style, so do not go below 50 °F (10 °C). Target a carbonation level around 1.5 to 2 volumes of CO_2. Once this beer is finished fermenting, a long aging period does wonderful things for the beer. Yes, you might be tempted to drink it after just a couple weeks, but try to set aside some bottles in a cool place and enjoy them over the years. BYO

English IPA

ENGLISH IPA
by the numbers

OG:	1.050–1.075 (12.4–18.2 °P)
FG:	1.010–1.018 (2.6–4.6 °P)
SRM:	8–14
IBU:	40–60
ABV:	5.0–7.5%

India pale ale was first created when an enterprising brewer crafted a beer to better survive the long sea voyage from England to India in the late 18th century. It is said that the beer had more hop bitterness than other beers of its time to help preserve the beer against spoilage. Today, English commercial examples of the style have become weaker, in both hops and alcohol. Many beers labeled as IPA in England are much closer to bitters than the India pale ales of old.

Quite a few brewers still want to recreate an historic English IPA. Some brewers, such as Luke Nicholas of Epic Brewing Company of Auckland, New Zealand have even tried placing kegs of IPA on ships to simulate the effect of transit to India on the beer. While many do a brilliant job, there are still plenty of poorly fermented, out of balance examples. The worst thing about some of these misguided attempts is the brewer loading an English IPA up with heavy, sweet malt character. While English IPA should always have a noticeable, supporting malt character, it should not be sweet, heavy or overly full. It should be more about biscuit, toast and caramel than it should be about sweetness. You want a reasonably crisp finish, one that is drier rather than sweeter.

Start with British pale ale malt as the base. It provides that background biscuit-like malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors.

Extract brewers should try to source an extract made from British pale ale malt. If you end up using domestic two-row malt extract, you will need to compensate with some additional specialty malts such as Munich, biscuit or Victory®, but use restraint. For a 5-gallon (19-L) batch, add about 5 to 10% of the total base malt.

All-grain brewers should use an infusion mash. A temperature in the range of 149 to 154 °F (65 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. A great starting point is 152 °F (67 °C) if you are unsure.

I like the clean, light malt character of American-style IPAs brewed with pale malt only, but that does not work well for English IPA. English IPA requires a touch more malt complexity and a slight touch of caramel character. English IPA should not have as much caramel character as English bitters, but a small dose of crystal malt adds caramel notes, body and helps fill out the malt flavors. The type of crystal malt also makes a difference. Darker color crystal malts add richer colors, as well as some dark caramel, toasty, roasted and raisin flavors. Lighter color crystal malts add sweeter caramel notes. The maximum crystal malt this style can handle without getting heavy and cloying is in the range of 8 to 10% with a color range of 10 to 150 °L. However, the darker the crystal, the less you should use. An IPA with 10% 150 °L crystal malt may not be cloying, but it can be too intense a flavor for this style. On the flip side, an IPA with all light color crystal malt will tend to be sweet and lack depth of character.

If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Victory®, biscuit and more are common additions in many recipes, but restraint is important so that the beer does not become saturated with non-fermentable dextrins and cloying flavors. In general, keep

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Bière de l'Inde

(5 gallons/19 L, all-grain)

OG = 1.062 (15.2 °P)
FG = 1.015 (4.0 °P)
IBU = 50 SRM = 12 ABV = 6.2%

Ingredients

11 lb. (5 kg) Crisp British pale ale malt (or similar English pale ale malt)
7.1 oz. (200 g) Great Western crystal malt (40 °L)
7.1 oz. (200 g) Castle biscuit malt (25 °L)
7.1 oz. (200 g) Great Western wheat (malt 2 °L)
5.3 oz. (150 g) Great Western crystal malt (120 °L)
9.6 AAU Challenger hops (1.20 oz./34 g of 8% alpha acids) (60 min.)
6.15 AAU Fuggles hops (1.23 oz./35 g of 5% alpha acids) (10 min.)
6.15 AAU East Kent Goldings hops (1.23 oz./35 g of 5% alpha acids) (0 min.)
White Labs WLP013 London Ale or Wyeast 1028 London Ale yeast

Step by Step

The bulk of the flavor comes from the base grain, so try to get British pale ale malt. The crystal and wheat malt I use in this recipe is from Great Western Malting Co., though an even better choice for this style is British-type crystal malts.

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.053 (13 °P).

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 11 grams of properly rehydrated dry yeast, 2 packages of liquid yeast, or 1 package of liquid yeast in a 2-liter starter. Ferment around 68 °F (20 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle.

Bière de l'Inde

(5 gallons/19 L, extract with grains)

OG = 1.062 (15.2 °P)
FG = 1.015 (4.0 °P)
IBU = 50 SRM = 12 ABV = 6.2%

Ingredients

7.34 lb. (3.33 kg) English pale liquid malt extract
7.1 oz. (200 g) Great Western crystal malt 40 °L
7.1 oz. (200 g) Castle biscuit malt 25 °L
7.1 oz. (200 g) Great Western wheat malt 2 °L
5.3 oz. (150 g) Great Western crystal malt 120 °L
9.6 AAU Challenger hops (1.20 oz./34 g of 8% alpha acids) (60 min.)
6.15 AAU Fuggles hops (1.23 oz./35 g of 5% alpha acids) (10 min.)
6.15 AAU East Kent Goldings hops (1.23 oz./35 g of 5% alpha acids) (0 min.)
White Labs WLP013 London Ale or Wyeast 1028 London Ale yeast

Step by Step

I use an English-type liquid malt extract custom made for my homebrew shop from a 100% Maris Otter malt. If you can't get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.053 (13 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. During that time add the Irish moss or other kettle finings with 15 minutes left in the boil and add the last two hop additions at 10 minutes remaining and at flame out. Chill the wort to 68 °F (20 °C) and aerate thoroughly. Ferment around 68 °F (20 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle.

the total of all specialty grain additions to less than 15% of an all-grain grist.

The Beer Judge Certification Program (BJCP) divides the India pale ale category into three sub-styles. You should think of all of them as "hoppy," but there is a vast difference in the level of hops between the IPA sub-styles. On the lower end is English IPA, which, while hoppy, does not have quite as bold a hop character as is found in American IPA. In an English IPA, the hops should never be overwhelming, resin-like, or shockingly bitter. English IPA should be firmly bitter, but the bittering and hop character should not completely overpower the fermentation and malt character. Bold, but not overdone is the key here. The trick is to get the right level of hop aroma and flavor, using traditional English hops, without going completely overboard.

English IPA is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger. The bittering level for English IPA is in the range of 40 to 60 IBU. Target a firm hop bitterness, without overwhelming the malt background. Keep in mind that there are many factors at play in the final impression of bitterness for the drinker. The starting and final gravities, water sulfate levels, the character malts selected, type of base malt, yeast strain, pitching rate, and even the yeast cell size have an impact on the perceived bittering. For most English IPAs, a bitterness-to-starting-gravity ratio (IBU divided by OG) between 0.7 and 1.0 gives the proper result. As a general rule of thumb in determining late hop amounts, include at least double the amount of bittering hops. Keep in mind this is just a generalization, since using very low or high alpha acid hops makes the equation faulty. For an English IPA include two or more late hop additions using two different hop varieties, totaling around 1 to 3 oz (28 to 85 g) for a 5 gallon (19 L) batch at 20 minutes or later. You can use more than two varieties, but do not go crazy. A couple of varieties creates an interesting complexity; ten different hop varieties creates an indistinct "hoppiness." Dry hopping and using a hop jack are also good ways to develop hop character for this style. If you do dry hop this beer, you should reduce the late hop additions to keep the hop flavor and aroma balanced with the malt character.

The sulfate content of brewing water affects the character of hop bitterness to a significant degree. When brewing with low sulfate water you are forced to add a large amount of hop alpha acids to develop enough bittering. However, adding large quantities of hops to get a stronger bittering can result in a resin-like character. Cutting back on the hops and adding a moderate amount of gypsum (or "Burtonizing" the water), results in a sharper, crisper hop bitterness without the resin character. While the BJCP style guide mentions high sulfur levels and sulfur character in examples of the style, an apparent sulfur character is a flaw. You shouldn't be trying to mimic the water of Burton-on-Trent. It is easy to overdo mineral additions, resulting in a chalky, metallic or harsh character. Most water only requires a small amount of gypsum. Start low, targeting half the amount of total sulfate typical of Burton water. If you do not know the sulfate content of your water, start with one gram of gypsum per gallon. Generally, you should need no more than three grams per gallon. It is usually better to add less than to add more and it only takes a small amount to accentuate hop bitterness. You can add gypsum to the mash or, if you are brewing with extract, you can add it directly to your boil kettle water before you heat it.

> "English IPA is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger."

"English" yeast strains provide a variety of interesting esters and leave some residual sweetness to balance a bitter beer. Many English yeasts tend to attenuate on the lower side (< 70%), but for an English IPA you want to choose one of the more attenuative English yeasts. While you do want some balancing malt sweetness, using a low attenuating yeast in a bigger beer can result in a beer that is too heavy and sweet. My favorites for this style are White Labs WLP013 (London Ale) and Wyeast 1028 (London Ale). They both provide a wonderful ester profile without being excessively fruity, and they attenuate a little more than most English yeasts. If you like to experiment, try to select English yeasts that attenuate in the mid 70s percent or higher. If you prefer dry yeast, Danstar Nottingham should produce good results.

At lower temperatures (such as <65 °F/18 °C), these yeasts produce a relatively low level of esters and at high temperatures (>70 °F/21 °C) they produce abundant fruity esters and fusel alcohol notes. I start fermentation in the middle of this range (68 °F/20 °C), letting the temperature rise a few degrees, slowly over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of diacetyl in the finished beer to a minimum. If you must use less attenuative yeast, take steps to ensure enough attenuation. You can lower the starting gravity, lower the mash temperature, or replace a portion of the base malt with simple sugar to aid in drying out the final beer.

Serving English IPA at cellar temperature, around 52 to 55 °F (11 to 13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the drinker from picking up the interesting fermentation and malt flavors and aromas of this style, so do not go below 50 °F (10 °C). Target a carbonation level around 2 to 2.5 volumes of CO_2 for bottled, 1.5 volumes for kegged, and 1 volume of CO_2 for cask conditioned beer. BYO

Extra Special Bitter

Extra special bitter, often referred to as English pale ale or strong bitter (ESB is a beer from Fuller's that has come to typify the style) is an average to moderate strength English ale.

An ESB should be firmly bitter by taste (often falling in the range of 30 to 50 IBUs), but the bitterness should not overpower the malt. Balance is important and most examples range from balanced to moderately bitter. While many commercial examples can be described as "hoppy," do not confuse this style with American pale ale. Strong bitter has more fermentation and malt character than American pale ale and the hop character is nothing like the big, bold hop character you find in many American-type pale ales. Moderate is the key word here and the hop character should be somewhat restrained and balanced.

This is the highest gravity version of the bitter family, which results in a few noticeable differences from its kin. ESB tends to have a slightly fuller malt backbone than special/best bitter and the appropriate bitterness to balance the additional malt. The additional malt creates a little more alcohol, a bit more body and a touch more flavor. Some examples will express a touch of alcohol flavor and aroma, although I prefer examples that are more subtle. Strong bitter ranges in color from golden to deep copper. These beers are also very clear, due to the highly flocculent yeast and the head is usually minimal, due to low carbonation.

British pale ale malt is a key component of any bitter recipe. It provides a background biscuit-like malt character that many people associate with fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors. A few malt companies (Crisp Malting is one) still produce British pale ale malt from cultivars such as Maris Otter using a traditional floor malting method. The result is malt with a slightly darker color (3.5 to 4.0 °L) and more flavor than other pale ale malts. It is the malt of choice for many English beer fanatics. British pale ale malt is highly modified and well suited to single infusion mashes and a moderate mash temperature around 152 °F (67 °C) is a good target for this style.

If you're brewing with extract, your best choice is an extract made from British pale ale malt. There are some British style malt extracts currently on the market made from 100% Maris Otter malt and they are an excellent choice for English beers. If you use North American two-row malt or extract made from it, you'll need to compensate with some additional specialty malts such as Munich, biscuit or Victory®, but use restraint. For a 5-gallon (19-L) batch, add no more than ¾ pound (0.34 kg).

While there are some modern examples of strong bitter, called summer bitter, brewed with pale malt only, my feeling is that a proper English bitter must have at least a touch of caramel character. Even a small dose of crystal malt adds caramel notes, body, and helps fill out the malt flavors. The type of crystal malt also makes a difference. Darker color crystal malts add richer colors, as well as some dark caramel, toasty, roasted and raisin flavors. Lighter color crystal malts add sweeter caramel notes. The maximum crystal malt this style can handle without getting heavy and cloying is around 8 to 10% with a color range of 10 to 150 °L. However, the darker the crystal, the less you should use. A bitter with 10% 150 °L crystal malt may not be cloying, but it can be too intense a flavor for this style. On the flip side, a bitter with all light color crystal malt will tend to be sweet and lack depth of character. Some bitter

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EXTRA SPECIAL BITTER
by the numbers

OG:	1.048–1.060 (11.9–14.7 °P)
FG:	1.010–1.016 (2.6–4.1 °P)
SRM:	6–18
IBU:	30–50
ABV:	4.6–6.2%

Strong Bitter

(5 gallons/19 L, all-grain)

OG =1.056 (13.9 °P)
FG = 1.016 (4.1 °P)
IBU = 41 SRM = 9 ABV = 5.3%

Ingredients

10.75 lb. (4.9 kg) Crisp Pale Ale malt or similar British pale ale malt
0.5 lb. (227 g) Great Western crystal malt 15 °L
0.25 lb. (113 g) Great Western crystal malt 120 °L
8.5 AAU East Kent Goldings hops (1.7 oz./48 g at 5% alpha acids (60 min.)
5 AAU East Kent Goldings hops (1.0 oz./28 g at 5% alpha acids (0 min.)
White Labs WLP002 (English Ale) or Wyeast 1968 (London ESB Ale) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or raise the temperature with a recirculating mash system to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.048 (11.9 °P).

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. During that time add any other kettle finings with 15 minutes left in the boil and the last hop addition at flame out. Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 11 grams (0.4 oz.) of properly rehydrated dry yeast, 2 packages of liquid yeast, or 1 package of liquid yeast in a 2-liter starter.

Ferment around 68 °F (20 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 1 to 2 volumes depending on your packaging.

If you're cask conditioning the beer, add priming sugar, any cask finings (gelatin or isinglass) and dry hop with ¼ to ½ oz. (7 to 14 g) of whole East Kent Goldings hops. Allow the beer to condition in the cask for several days and serve via a beer engine or by gravity feed at 50 to 55 °F (10 to 13 °C).

Strong Bitter

(5 gallons/19 L, extract with grains)

OG = 1.055 (13.6 °P)
FG = 1.016 (4.1 °P)
IBU = 41 SRM = 9 ABV = 5.2%

Ingredients

7 lb. (3.18 kg) English pale liquid malt extract (If you can't get fresh liquid malt extract, it is better to use 5.5 lb (2.5 kg) English dried malt extract)
0.5 lb. (227 g) Great Western crystal malt 15 °L
0.25 lb. (113 g) Great Western crystal malt 120 °L
8.5 AAU East Kent Goldings hops (1.7 oz./48 g at 5% alpha acids) (60 min.)
5 AAU East Kent Goldings hops (1.0 oz./28 g at 5% alpha acids) (0 min.)
White Labs WLP002 (English Ale) or Wyeast 1968 (London ESB Ale) yeast

Step by Step

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.047 (11.6 °P). Stir thoroughly to help dissolve the extract and bring the wort to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. During that time add any other kettle finings with 15 minutes left in the boil and the last hop addition at flame out.

Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 11 grams (0.4 oz.) of properly rehydrated dry yeast, 2 packages of liquid yeast, or 1 package of liquid yeast in a 2-liter starter.

Ferment around 68 °F (20 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week or less. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and
bottle. Target a carbonation level of 1 to 2 volumes depending on your packaging.

If you're cask conditioning the beer, add priming sugar, any cask finings (gelatin or isinglass) and dry hop with ¼ to ½ oz. (7 to 14 g) of whole East Kent Goldings hops. Allow the beer to condition in the cask for several days and serve via a beer engine or by gravity feed at 50 to 55 °F (10 to 13 °C).

recipes include other specialty malts. My favorites are Special Roast, Victory®, biscuit and aromatic, but a fine bitter can be made without them. Commercial recipes range from including minimal, low-color specialty malt additions to considerable amounts of mid-color malts. Some commercial recipes also use a little chocolate or black malt for color. If you take this approach, the amount of highly kilned malt should be small enough that the flavor is not apparent in the finished beer. Use an ounce or two (28–57 g) at most in a 5-gallon (19-L) batch. Specialty malts are a big part of what differentiates one brewer's bitter from another, so feel free to experiment. If you do want to brew a summer bitter, just replace any specialty malts with more British pale ale malt.

While corn, cane sugar and other adjuncts are traditional in brewing many English beers, I usually omit them unless I'm crafting a big beer and I need to increase wort fermentability, I'm trying to thin the body, or I'm trying to reduce the intensity of the base malt flavors. If you're using a less attenuative yeast and don't have the ability to control the wort fermentability through mash temperature, then replacing some base malt in your recipe with simple sugar can help. Simple sugars ferment fully, thin the beer, and provide very little in the way of flavor contributions. I've seen recipes that use brown sugar, but don't count on it to add much in the way of flavor. Use it only for thinning the beer. If you want to add brown sugar/caramel-type flavors, use caramel malts. Corn and other non-barley adjuncts reduce the overall malt flavors, when used in place of the base malted barley. I prefer a bold base malt flavor, so I don't use adjuncts in my strong bitter.

Bitters are best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger. The bittering level for strong bitter is in the range of 30 to 50 IBU. What you're targeting is noticeable hop bitterness without overwhelming the malt background. Keep in mind that there are many factors at play in the final impression of bitterness for the drinker. The starting and final gravities, the character malts selected, the type of base malt, the yeast strain, the pitching rate, and even the yeast cell size have an impact on the perceived bittering. For most strong bitters, a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.6 and 0.9 gives the proper result. The bulk of the hopping should be as a bittering addition at 60 minutes. I prefer a single, large, late hop addition near flame-out. This gives the beer a noticeable hop aroma without too much hop flavor like earlier additions may give. You can add multiple small hop additions around ¼ to ½ ounce (7 to 14 g) for a 5-gallon (19-L) batch at 20 minutes and later, but for this style I like one larger addition. Remember that this isn't an extremely hoppy style, so don't go overboard. Traditional cask conditioning can include dry hopping, perhaps a ¼ to ½ ounce (7 to 14 g) per 5 gallons (19 L). If you do dry hop, reduce the late hop additions to keep the hop flavor and aroma under control.

Much has been written about the high sulfate water of Burton-upon-Trent being a key element in brewing bitters. It is true that water with high sulfate content enhances the sharp, bitter aspect of hops. However, this is very easily overdone, which results in a chalky, metallic, or harsh character. Brewers today brew good bitter with a wide range of water types. In most cases, any water is well suited as is unless it is on the soft end of the spectrum. If you have soft water, add some gypsum or Burton salts, but start low, targeting half the amount of sulfate typical of Burton water. Use no more than 1 teaspoon of Burton salts per 5 gallons (19 L) or no more than 3 grams (0.1 oz.) of gypsum per gallon (3.8 L). It is always better to add less than more. While this won't exactly mimic the water of Burton-upon-Trent, it is more than enough to accentuate the hop bitterness. You can add your mineral salts to the mash water or, if you're extract brewing, you can add the mineral salts to your water before you heat it. For all other water types, first try brewing this style without any additional mineral salts.

Like many beer styles, fermentation creates much of the flavor and aroma in most British beers. "English" yeast strains provide a variety of interesting esters and tend to be low to moderately attenuating, leaving some residual sweetness to balance the bitterness and help fill out the beer. They are also extremely flocculent, which makes them ideal for cask conditioning. These yeasts produce a fairly low level of esters at cool fermentation temperatures (<65 °F/18 °C) and abundant fruity esters and alcohol notes at high temperatures (>70 °F/21 °C). It is better to start in the middle of this range, letting the temperature slowly rise a few degrees over a couple days. This method creates the expected level of esters and keeps the amount of diacetyl in the finished beer at a minimum.

My favorite yeasts for this style are White Labs WLP002 (English Ale) and Wyeast 1968 (London ESB Ale). They provide a nice ester profile without being over the top. If you like to experiment, try to select English yeasts that create interesting ester profiles and an attenuation percentage from the upper 60s to the low 70s Fahrenheit (low to mid 20s Celsius). If you prefer dry yeast, DCL Safale S-04 produces good results. No matter which yeast you're using, it is important to aerate the wort immediately before or after pitching your yeast. Oxygen is important to proper cell growth and growth is important to beer flavor development.

Serving bitter at around 55 °F (13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the drinker from picking up the interesting fermentation and malt flavors and aromas, so don't go below 50 °F (10 °C). Target a carbonation level around 2 volumes of CO_2 for bottled, 1.5 volumes for kegged, and 1 volume of CO_2 for cask conditioned beer. BYO

German Hefeweizen

GERMAN HEFEWEIZEN
by the numbers

OG: .....1.044–1.052 (11–12.9 °P)
FG: .....1.010–1.014 (2.6–3.6 °P)
SRM: 2–8
IBU: 8–15
ABV: 4.3–5.6%

Most people seem to either love or hate German wheat beers based on early taste experiences. Those that love hefeweizen probably had the chance to try a great example with the proper level of fermentation-derived esters and phenols. Those who dislike hefeweizen likely experienced some bad examples, where the yeast character was overwhelming or completely out of balance.

When I first started judging beer competitions there were two categories I dreaded: Belgian strong ales and German wheat beers. Back then craft brewers and homebrewers alike often made very poor examples, with the Belgian strong ales like sugary rocket fuel and the German wheat beers similar to banana/clove candy mixed with uncooked dough. A big part of the problem was brewers reading too much into competition style guidelines. When guidelines mention a warming alcohol note, the inexperienced brewer brews a beer that tastes like exhaust from a jumbo jet. We should all remind ourselves from time to time that the descriptions in guidelines often describe things as detected by a very sensitive judging palate, focused on detecting every last little nuance of a beer.

Hefeweizen is a traditional Bavarian wheat beer brewed with at least 50% wheat malt and yeast that produce a signature clove and banana character. The hopping rate is very low, which allows an underlying, grainy, bready flavor from the wheat and Pilsner malt to shine through. It is a light, approachable beer with a hazy appearance and has a soft texture. It has a high level of protein and suspended yeast that makes hefeweizen a cloudy, or at least a hazy, beer. While most brewers are familiar with a cloudy German hefeweizen, there is also a filtered, brilliantly clear version called kristallweizen. Hefeweizen ranges in color from pale straw to dark gold and has a large, dense, creamy white head. The aroma of a good hefeweizen includes moderate spicy clove notes and fruity banana esters. However, one of the most common mistakes in homebrewed weizen-style beers is having too much clove and banana character. Brewers might point to the Beer Judge Certification Program (BJCP) style guide which says these phenolic and ester compounds can range up to "strong," but do not think for a minute that it means a clove/banana bomb is acceptable. These fermentation compounds should never overwhelm the other characteristics of the beer. It is critical that a brewer keeps these compounds balanced with the overall harmony of the beer, especially the malts. For new brewers, it might be better to think of the word "strong" as meaning "clearly evident." You should be able to smell and taste a bready, grainy character along with the clove and banana. The balance between bittering and sweetness is usually even, though some examples can have an initial sweetness up front. While I do not think an obvious acidic or tart character is indicative of great hefeweizen, I do think a light citrusy character along with proper attenuation, pH, and hop/malt balance keeps this style refreshing and balanced.

When I was a new brewer, I brewed less-than-perfect hefeweizen and I played around with all sorts of strange malt combinations. It was my dear friend, Harold Gulbransen, who convinced me that simple was better. Use at least 50% wheat malt and the rest high quality continental Pilsner malt. If you wish, a small portion of head or body building dextrin malt is also acceptable. A common hefeweizen recipe would be 50 to 70% wheat malt, 30 to 50% Pilsner malt, and 0 to 5% light colored dextrin malt. That is all you need to brew a great hefeweizen. While you might consider adding some other malts to develop bready flavors or body, I learned it is much better to focus on

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Harold-is-Weizen
(5 gallons/19 L, all-grain)

OG = 1.049 (12 °P)
FG = 1.012 (3 °P)
IBU = 13 SRM = 3 ABV = 4.8%

Ingredients

4.85 lb. (2.2 kg) Great Western wheat malt (2 °L) (or similar)
4.85 lb. (2.2 kg) Durst Pilsner malt (2 °L) (or similar)
2.68 AAU Hallertau pellet hops (0.67 oz./19 g of 4% alpha acids) (60 min.)
Wyeast 3068 (Weihenstephan Weizen) or White Labs WLP300 (Hefeweizen Ale) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight). If you have the ability to do a step mash, start with a rest at 110 °F (43 °C) for 20 minutes and then raise to a temperature of 152 °F (67 °C) until conversion is complete. Otherwise, do a single infusion mash at 151 °F (66 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.038 (9.4 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methiomine (SMM) present in the lightly kilned pilsner malt and results in less Dimethyl sulfide (DMS) in the finished beer. Add the bittering hops with 60 minutes remaining in the boil. I skip using kettle finings in this beer, unless making a kristallweizen. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 1.7 packages of fresh liquid yeast or 1 package of liquid yeast in a 1.3-liter starter. Ferment at 62 °F (17 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete in a week, but do not rush it. The cooler than average ale fermentation temperature can extend the time it takes for complete attenuation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

The Weihenstephan Brewery, in Weihenstephan, Germany is one of the oldest breweries in the world. They brew Weihenstephaner Weissbier.

Harold-is-Weizen
(5 gallons/19 L, extract)

OG = 1.049 (12.1 °P)
FG = 1.013 (3.2 °P)
IBU = 13 SRM = 5 ABV = 4.8%

Ingredients

4.85 lb. (2.2 kg) wheat liquid malt extract (4 °L)
2.68 AAU Hallertau pellet hops (0.67 oz./19 g of 4% alpha acids) (60 min.)
Wyeast 3068 Weihenstephan Weizen or White Labs WLP300 Hefeweizen Ale yeast

Step by Step

I have used a number of wheat extracts with good results. Feel free to use whatever your shop recommends. Always choose the freshest extract that fits the beer style. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead.

Mix enough water with the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.042 (10.4 °P). Stir thoroughly to help dissolve the extract and bring to a boil.The total wort boil time is 60 minutes. Add the bittering hops with 60 minutes remaining in the boil. I skip using kettle finings in this beer, unless making a kristallweizen. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is 1.7 packages of fresh liquid yeast or 1 package of liquid yeast in a 1.3-liter starter. Ferment at 62 °F (17 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete in a week, but do not rush it. The cooler than average ale fermentation temperature can extend the time it takes for complete attenuation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

your process. Keep in mind brewers craft the world's best examples from this simple recipe.

Historically, most weizen-type beers would have been decoction mashed and Gulbransen is a staunch proponent of decoction for hefeweizen. "I like decoction because it lends a full, toasty maltiness that seems absent in a single infusion mash," Gulbransen said. "Since today's malts are so highly modified, I prefer to start my mash at 130 to 134 °F (54 to 57 °C) to avoid a protein rest. I then pull a single decoction, boiling that for 10 to 15 minutes, before I return it to the mash and raise the entire mash for a rest at 152 °F (67 °C)." I can attest to the quality of Gulbransen's hefeweizen; his methods do work well.

Matthew Brynildson of Firestone Walker Brewing Company in Paso Robles, California has won many awards. They won an amazing six medals at the 2010 World Beer Cup. They also won their third Champion Brewery award and took a gold medal with their hefeweizen. I asked Brynildson what he felt was key to making a world-class hefeweizen. Brynildson favors a step mash and considers a ferulic acid rest very important to the proper development of fermentation flavors for this style.

"Mashing at 110 °F (43 °C) aids in the hydrolysis of ferulic acid. The yeast use ferulic acid to produce 4-vinyl guaiacol, which is the phenolic (clove-like) flavor compound that is so important in this style," he said.

If you do not have the ability to perform a decoction or a step mash, or are too lazy like me, then do not worry. Yes, a decoction mash will enhance the malt profile and a step mash will ensure enough clove flavors are present, but most important is using the best quality malt or malt extract you can find and fermenting the beer properly. You should be able to make a fantastic example of the style just using a single infusion mash. Once you have mastered that, then you can try the mash techniques of masters like Gulbransen and Brynildson.

For a single infusion mash, target a temperature range of 150 to 154 °F (66 to 68 °C). If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more fullness. If you are making a bigger beer, use the lower end of the range to avoid too full of a character, which can limit drinkability. Keep in mind wheat malt is huskless, so if your equipment is prone to stuck mashes, you can add a volume of rice hulls equal to the volume of wheat malt.

> "Try to use German hops for German beers, such as Hallertau, Spalt, Tettnang, Perle, Magnum or Tradition."

This is an easy style for extract brewers. Select a fresh, well-made extract with at least 50% wheat malt and the rest Pilsner malt. Most wheat extracts are approximately half wheat and half Pilsner or two-row malt.

Try to use German hops for German beers, such as Hallertau, Spalt, Tettnang, Perle, Magnum or Tradition. If you cannot source one of those, Liberty or Mount Hood can be an acceptable substitute. Balance the beer with enough hop bitterness to balance, but not enough to overwhelm the malt sweetness of the beer. The balance should be even, or maybe slightly sweet, but not more. Brynildson also recommends keeping the hopping levels low. He targets less than 10 IBUs in their weiss, which is a bitterness-to-starting gravity ratio (IBU divided by OG) of 0.2. The bulk of the hopping should be as a bittering addition at 60 minutes. Limit late hop additions, if used at all, to a small addition of noble hops near the end of the boil.

My favorite yeast strains for all weizen-type beers are White Labs WLP300 (Hefeweizen Ale) and Wyeast 3068 (Weihenstephan Weizen). You can try other weizen-type yeasts, and might prefer one strain to the another, so feel free to experiment.

One vital piece of information I lacked when I first started brewing hefeweizen was proper fermentation temperature. I tried all sorts of temperatures with mediocre results before Gulbransen told me to ferment at 62 °F (17 °C). I was skeptical, but the results were spectacular. That temperature will work well in most cases, but keep in mind many other fermentation factors play a role in determining the final flavor profile of the beer. For example, increasing the ratio of glucose to maltose in the wort increases the production of isoamyl acetate (banana flavor), but so does adjusting the pitching rate or other factors that affect growth. Keep in mind that while yeast strain and temperature play a large role in fermentation character, growth rate, pitching rate and other factors all have a significant impact on the types and amounts of esters yeast produce.

While some brewers like to pitch a reduced cell count to increase fermentation characteristics, I am not a big fan of this technique for homebrewing as it can also result in under-attenuation when temperature, oxygen or yeast viability is not carefully controlled. An under-attenuated hefeweizen is far worse than one with a slightly less than ideal ester profile. Brynildson says that he, "found it is best to utilize freshly propagated yeast and to avoid over pitching the wort." So do not over pitch and do not under pitch. You want a certain amount of growth to develop the ideal flavor profile. Do not be afraid to experiment with different pitching rates and oxygen levels, but only experiment with one parameter at a time, until you get the right fermentation character for your brewery.

One last piece of advice is to consume hefeweizen fresh. What many people think is "malt character" in imported examples is often just a form of staling. BYO

German Pilsner

German Pilsner recipes seem so simple, but brewing a perfect example is a challenge that many brewers never master. A big part of the challenge is getting a dry, crisp finish to the beer.

Historically, German Pilsner was an attempt to copy Bohemian Pilsener. German Pilsner is crisper and drier with a sharper bitterness that tends to linger in the finish. It is also more highly attenuated and lighter in body and color, having a medium-light body and ranging from pale straw to light gold in appearance. The malt character is evident as a light Pilsner grainy flavor and aroma. Hop character is a mix of floral and spicy noble hops, usually ranging from low to moderate. The fermentation character is clean, and very low in esters.

I would never attempt to make a German Pilsner without using continental Pilsner malt. You can use other pale malts if you have no other option, but the light, grainy taste of high quality Pilsner malt is right on target for this style and it is the only malt you need for a great German Pilsner. You can add head and body forming dextrin malts such as Carapils® or Carafoam®, but keep these between 0 and 10% of the grist.

Extract brewers should use a Pilsner-type extract that attenuates at least 75% or more. Most light colored extracts will attenuate fairly well and should be close enough. Those made from continental Pilsner malt would be the best choice, but there are several good North American Pilsner or Pilsner-like extracts out there. Even if using an extract with a lower fermentability, the most important thing is to ferment it to the maximum extent possible.

Perhaps, historically, a brewer would use a decoction mash when brewing German Pilsner, but I find that high quality continental Pilsner malt and a single infusion mash will produce a beer every bit as good as the best commercial examples. It is more important to invest time and effort in fermentation, sanitation and post fermentation handling than decoction. To ensure alpha amylase has also completed its work, you can include a short additional rest at 154 to 158 °F (68 to 70 °C).

For a single infusion mash, target a mash temperature range of 147 to 150 °F (64 to 66 °C). If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more body. Keep in mind that lower mash temperatures need longer to convert than high mash temperatures. The first few times you make a beer like this, test your mash for conversion and extend your mash until you are confident conversion is complete.

In this style, hop flavor and aroma should always be present and can range from low to high. I really like using German grown Hallertau hops for flavor and aroma, though sometimes they are hard to source. Other German grown hops, such as Tettnang, Spalt, Perle or Tradition, work well also. These hops when grown outside of Germany can still work well, but you should check with your supplier first if you are not sure how closely they match the German grown hops. If you cannot get any of those hops, you do have some flexibility. The trick is to select hops with that same flowery or spicy noble hop character. You do not want to use anything fruity or citrusy. Some decent substitutions are Liberty and Mt. Hood. You can also try Crystal, Ultra and Vanguard. It is really the overall impression that matters. The big picture is that you want moderate hop character and a firm bitterness, but both should complement and integrate well with your malt and yeast choices. The balance of bittering versus malt sweetness should always be to the bitter side. You want a firm bittering presence, one that is obvious,

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GERMAN PILSNER
by the numbers

OG:	1.044–1.050 (11–12.4 °P)
FG:	1.008–1.013 (2.1–3.3 °P)
SRM:	2–5
IBU:	25–45
ABV:	4.4–5.2%

German Pilsner
(5 gallons/19 L, all-grain)

OG = 1.048 (11.9 °P)
FG = 1.009 (2.3 °P)
IBU = 37 SRM = 3 ABV = 5.1%

Ingredients

9.7 lb. (4.4 kg) Durst Continental Pilsner Malt 2 °L (or similar)
6.64 AAU Perle pellet hops (0.83 oz./24 g of 8% alpha acids) (60 min.)
1.68 AAU Hallertau pellet hops (0.42 oz./12 g of 4% alpha acids) (15 min.)
1.68 AAU Hallertau pellet hops (0.42 oz./12 g of 4% alpha acids) (1 min.)
White Labs WLP830 (German Lager) or Wyeast 2124 (Bohemian Lager) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 147 °F (64 °C). Hold the mash at 147 °F (64 °C) until enzymatic conversion is complete, which may take 90 minutes or more at this low temperature. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.037 (9.3 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methionine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl sulfide (DMS) in the finished beer. Add the first hop addition with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. The other hop additions are at 15 minutes and 1 minute left in the boil. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is three packages of liquid yeast or one package of liquid yeast in a 6-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

German Pilsner
(5 gallons/19 L, extract)

OG = 1.048 (11.9 °P)
FG = 1.009 (2.3 °P)
IBU = 37 SRM = 3 ABV = 5.1%

Ingredients

6.83 lb. (3.1 kg) Pilsner liquid malt extract 2 °L
6.64 AAU Perle pellet hops (0.83 oz./24 g of 8% alpha acids) (60 min.)
1.68 AAU Hallertau pellet hops (0.42 oz./12 g of 4% alpha acids) (15 min.)
1.68 AAU Hallertau pellet hops (0.42 oz./12 g of 4% alpha acids) (1 min.)
White Labs WLP830 (German Lager) or Wyeast 2124 (Bohemian Lager) yeast

Step by Step

I have used a number of Pilsner-type extracts. Most do an admirable job of brewing a German Pilsner. If you cannot get fresh liquid malt extract, use an appropriate amount of dried extract instead. Using fresh extract is very important to this style.

Würzburger Hofbräu in Würzburger, Germany brews a classic German Pilsner.

Add enough water to the malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and the gravity is 1.041 (10.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the first hops. Add Irish moss or other kettle finings with 15 minutes left in the boil. The other hop additions are at 15 minutes and 1 minute left in the boil. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is three packages of liquid yeast or one package of liquid yeast in a 6-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

maybe even sharp, but not harsh. The bitterness-to-starting gravity ratio (IBU divided by the decimal portion of the specific gravity) ranges from 0.5 to 1.0, but I like to target around 0.7 to 0.8.

You can make a fine example of this style with most water, but *BYO*'s "Mr. Wizard" columnist Ashton Lewis says that making excellent very clean lagers requires very low carbonate water. He prefers to start with reverse osmosis water and adds calcium chloride to adjust to 25 ppm calcium. While that is true, I personally feel it is also important to have at least a small amount of sulfate in the water. The sulfate content of brewing water affects the perception of hop bitterness to a significant degree. Very low sulfate content results in a "soft" or "flabby" bitterness, but bitterness in a German pilsner should be firm and sharp. Adding a small amount of gypsum results in a sharper, crisper hop bitterness. Most water only requires a small amount of gypsum. If you do not know the sulfate content of your water, start with one gram of gypsum per gallon. Generally, you should never need more than two or three grams per gallon. It is usually better to add less than to add more and it only takes a small amount to accentuate hop bitterness. You can add gypsum to the mash or, if you are brewing with extract, you can add it directly to your boil kettle water before you heat it.

You can ferment German Pilsner with almost any lager yeast. My favorites are White Labs WLP830 (German Lager) and Wyeast 2124 (Bohemian Lager), and former "Style Profile" columnist Horst Dornbusch is fond of Wyeast 2042 (Danish Lager). You need around 340 billion clean, healthy cells to properly ferment 5 gallons (19 L) of this beer, which is double what you would use for an equivalent strength ale. For a simple, non-stirred starter, one package of liquid yeast in 1.5 gallons (6 L) will result in the right amount of yeast. If you are not making a starter, you will need about three packages of fresh liquid yeast. Even if you have three packages of yeast, it is still prudent to make a small starter from the packages about four to six hours before pitching. This ensures that the yeast is viable and gives them a chance to get started before fermentation.

A good German Pilsner is clean and crisp and a large part of that comes from excellent fermentation practices. You should be putting at least as much effort into fermentation as you do producing the wort. The Beer Judge Certification Program (BJCP) style guide mentions the presence of sulfur from fermentation and DMS from the lightly kilned Pilsner malt, but you should still strive to eliminate these flavors and aromas from this beer.

> "A good German Pilsner is clean and crisp and a large part of that comes from excellent fermentation practices."

When making lagers, I like to chill the wort down to 44 °F (7 °C), oxygenate, and then pitch my yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) and then I hold this temperature for the remainder of fermentation. If fermentation seems sluggish at all after the first 24 hours, I am not afraid to raise the temperature a couple degrees more. This is similar in theory to a Narziss fermentation, where the first two-thirds of the fermentation is done cold and the final third is done warmer. The idea is to reduce the diacetyl precursor alpha-acetolactate, which the yeast create during the early phase of fermentation. Once the growth phase of fermentation is complete, it is important that fermentation be as vigorous as possible. It may never be as robust as fermentation at ale temperatures, but it is important to have enough activity to blow off aromatic sulfurs and other unpleasant compounds. Vigorous yeast activity at the end of fermentation also improves reduction of compounds such as diacetyl.

Since diacetyl reduction is slower at colder temperatures, a cold-fermented lager may require a diacetyl rest. To perform a diacetyl rest, simply raise the temperature into the 65 to 68 °F (18 to 20 °C) range for a two-day period near the end of the fermentation. While you can do a diacetyl rest after the fermentation reaches terminal gravity, a good time for a diacetyl rest is when fermentation is 2 to 5 specific gravity points (0.5 to 1 °P) prior to reaching terminal gravity. Brewers ask how they should know when fermentation has reached that stage. My advice is to raise the fermentation temperature for a diacetyl rest as soon as you see fermentation activity significantly slowing. It will not hurt the beer and it should help the yeast reach complete attenuation as well.

It seems that every beer improves with some period of cold conditioning and German Pilsner is no exception. Traditional lager conditioning utilizes a slow temperature reduction before fermentation reaches terminal gravity. The purpose of the slow cooling rate is to avoid sending the yeast into dormancy. After a few days, the beer reaches a temperature close to 40 °F (4 °C) and the brewer transfers the beer into lagering tanks. If you want to use this technique, you will need precise temperature control so that fermentation slowly continues and the yeast remains active. Rapidly chilling the beer near the end of fermentation can cause yeast to excrete a greater amount of ester compounds instead of retaining them.

I wait until fermentation is complete, including any steps such as a diacetyl rest, before lowering the beer temperature. The yeast is far more active and able to reduce fermentation byproducts at higher temperatures. Once the yeast has completed every job needed, I use a period of cold storage near freezing. This allows very fine particulates to settle out and the beer flavors to mature. BYO

Imperial IPA

IMPERIAL IPA
by the numbers

OG:	1.070–1.090 (17–21.6 °P)
FG:	1.010–1.020 (2.6–5.1 °P)
SRM:	8–15
IBU:	60–120
ABV:	7.5–10%

Like many people, when I was new to craft beer I favored beers with a maltier balance, ones that were not so bitter. At that time a homebrew shop owner told me that most people start out preferring malty beer styles, but eventually everyone craves hoppy beers. He was right and it didn't take long before I began to appreciate and then crave beers with a bold hop bitterness, flavor, and aroma. India pale ale quickly became an everyday beer for me. I think this appreciation of hop bitterness and character eventually develops in almost all craft beer lovers and for many, that craving just can't be satisfied. Like horror movie zombies hungry for brains, hoppy beer lovers seek out new beers to satisfy their ever increasing hunger for hop bitterness, flavor and aroma. For those infected with this Humulus lupulus disease, one of the best cures on the market is a couple of pints of imperial IPA.

Imperial IPA is a beer bigger in alcohol strength, hop bittering and hop character than standard India pale ale. However, the malt character in an imperial IPA is not necessarily bigger than that found in an American IPA. Too big a malt character makes a beer more like a barleywine.

An imperial IPA should be intensely hoppy. A drinker new to hoppy beers might consider the hop bittering, flavor and aroma overwhelming. The aroma and flavor are usually full of citrus and pine notes from the liberal use of American hop varieties. Grassy, resiny and fruity hop notes are also common. This style, like many American-style beers, has a clean fermentation character. Alcohol can be evident, but it should never really be hot or harsh. These beers range in appearance from golden to a reddish copper. While there are excellent examples of the style that are filtered clear, a hazy appearance is not a problem. Massive dry hopping can leave a beer quite hazy from all that hop goodness. The overall flavor should be about hops and malt is only a secondary characteristic. It should be a clean, relatively simple malt background that supports the massive hop load, but does not try to balance it. If you want more balance with your hops, think about brewing an American barleywine instead. Same goes for the mouthfeel and finish. Imperial IPA never has more than a medium body and should have a dry to medium-dry finish. A big body or sweet finish is a flaw and more appropriate for a barleywine.

While one might describe imperial IPA as a bigger than normal IPA, you can't just make a bigger IPA. Well, you can, but the result is likely to be too heavy, with too much residual sweetness. The best imperial IPAs have a dry finish and the finishing gravity should be in the 1.010 to 1.015 (2.6 to 3.8 °P) range, no matter how big the starting gravity. This is a key facet of keeping the beer drinkable.

My good friend Mike "Tasty" McDole has won more than a few major awards for his imperial IPA, so I asked him what he considers to be the single most important aspect of brewing this style. He told me, "This is a very hop forward beer and you cannot achieve that goal unless you keep the malt character from getting in the way. The best way to do that is to use simple sugar."

Russian River Brewing Company's Pliny the Elder, which many consider the finest example of this style, also uses simple sugar to ensure a dry, light malt character. I feel the addition of simple sugar (corn sugar, cane sugar, beet sugar) is critical to making a great example of this style. Put aside any fears you might have that adding sugar will make your beer too thin or "cidery." That is only an issue when using a very large percentage of sugar. Target around 10% of the grist as simple sugar. These easily fermentable sugars also assist in achieving a low

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Hop Hammer

(5 gallons/19 L, all-grain)

OG = 1.079 (19.2°P)
FG = 1.013 (3.3°P)
IBU = ~100 SRM = 7
ABV = 8.8%

Ingredients

13.5 lb. (6.12 kg) Great Western American two-row malt (2 °L)
0.5 lb. (227 g) Great Western wheat malt (2 °L)
0.5 lb. (227 g) Great Western crystal malt (40 °L)
1.25 lb. (0.56 kg) corn sugar (0 °L)
26.25 AAU Warrior hops (1.75 oz./50 g at 15% alpha acids) (90 min.)
22.75 AAU Chinook pellet hops (1.75 oz./50 g at 13% alpha acids) (90 min.)
12 AAU Simcoe® pellet hops (1.0 oz./28 g at 12% alpha acids) (45 min.)
14 AAU Columbus pellet hops (1.0 oz./28 g at 14% alpha acids) (30 min.)
15.75 AAU Centennial pellet hops (1.75 oz./50 g at 9% alpha acids) (0 min.)
12 AAU Simcoe® pellet hops (1.0 oz./28 g at 12% alpha acids) (0 min.)
35 AAU Columbus pellet hops (2.5 oz./71 g at 14% alpha acids) (dry hop)
13.5 AAU Centennial pellet hops (1.5 oz./43 g at 9% alpha acids) (dry hop)
18 AAU Simcoe® pellet hops (1.5 oz./43 g at 12% alpha acids) (dry hop)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 150 °F (66 °C). Hold the mash at 150 °F (66 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.061 (15.1 °P).

The total wort boil time is 90 minutes. Add the bittering hops right at the beginning, with 90 minutes remaining in the boil. Add the other hop additions according to the schedule and Irish moss or other kettle finings at 15 minutes left in the boil. Chill the wort rapidly to 67 °F (19 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate.

Use 15 grams of properly rehydrated dry yeast, 3 liquid yeast packages, or make an appropriate starter. Ferment at 67 °F (19 °C), slowly raising the temperature to 70 °F (21 °C) as the fermentation begins to slow. Fermentation should be complete in about a week.

As soon as the bulk of the yeast begins to drop, transfer the beer to a second fermenter and add the dry hops. The pellets should break up and eventually settle to the bottom of the fermenter. This might take a few days. Let the beer sit on the hops for another 7 days, approximately 7 to 10 days total. Keg or bottle, targeting a carbonation level of 2 to 2.5 volumes.

Hop Hammer

(5 gallons/19 L, extract with grains)

OG = 1.079 (19.1 °P)
FG = 1.013 (3.3 °P)
IBU = 100+ (315 calculated)
SRM = 6 ABV = 8.8%

Ingredients

8.0 lb. (3.63 kg) Briess light liquid malt extract (2 °L)
0.5 lb. (227 g) Great Western wheat liquid malt extract (4 °L)
0.5 lb. (227 g) Great Western crystal malt (40 °L)
1.5 lb. (0.68 kg) corn sugar (0 °L)
26.25 AAU Warrior pellet hops (1.75 oz./50 g at 15% alpha acids) (90 min.)
22.75 AAU Chinook pellet hops (1.75 oz./50 g at 13% alpha acids) (90 min.)
12 AAU Simcoe® pellet hops (1.0 oz./28 g at 12% alpha acids) (45 min.)
14 AAU Columbus pellet hops (1.0 oz./28 g at 14% alpha acids) (30 min.)
15.75 AAU Centennial pellet hops (1.75 oz./50 g at 9% alpha acids) (0 min.)
12 AAU Simcoe® pellet hops (1.0 oz./28 g at 12% alpha acids) (0 min.)
35 AAU Columbus pellet hops (2.5 oz./71 g at 14% alpha acids) (dry hop)
13.5 AAU Centennial pellet hops (1.5 oz./43 g at 9% alpha acids) (dry hop)
18 AAU Simcoe® pellet hops (1.5 oz./43 g at 12% alpha acids) (dry hop)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in ½ gallon (~2 liters) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume around 6.5 gallons (24.4 L) and the gravity is 1.061 (15.0 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Follow the remainder of the all-grain version of this recipe at left.

finishing gravity. If you're an extract brewer and need more attenuation, replace more of the base malt extract with simple sugar. If you need less attenuation, then shift the percentage toward the base malt.

The majority of the grist in an imperial IPA is North American two-row malt or a light colored extract made from the same. A good quality North American two-row malt provides a nice background malty, clean, slightly bready character, which is evident in the beer, but not overwhelming. That is what you want, malt character, but one that doesn't cover the hop character.

In the best examples, the use of specialty malts for flavor and head retention is restrained. A small amount of crystal malt, for a subtle touch of caramel, is a nice addition. A little wheat is common in many recipes to improve head retention. Some examples obviously have more crystal and other specialty malts added, but that can negatively impact drinkability, as the beer starts becoming richer and sweeter. If you want to make a darker beer, switching to darker specialty malts rather than increasing the amount of a lower color specialty malt, is the way to go. It does change the flavor, but it will help to preserve the dry finish required for the style. Keep in mind the best examples of this style, such as Pliny the Elder, are all on the pale end of the range.

This is a great style for extract brewers, as there are plenty of high quality pale malt extracts on the market and the focus in this style is really on the hops. When choosing an extract, avoid any with a low level of fermentability. If your favorite extract doesn't quite attenuate enough, swap out a little more of the malt extract with simple sugar the next time you brew this beer. For all-grain brewers, a single infusion mash works well. Target a mash temperature range of 148 to 152 °F (64–67 °C). If you are making a higher gravity beer or are approaching a double digit percentage of specialty malts, use the lower end of this temperature range to ensure the beer attenuates enough. If you are making a smaller beer, use the higher end of the range to retain a bit more body.

The intense hop character of this beer style comes from a combination of an insane amount of hops and selecting the right hop varieties. One very important thing to keep in mind is that the hop varieties and quantities are more important than their alpha acid levels. Once the bittering gets past a certain level, you're only interested in the oils, resins and other hop compounds that add flavor, aroma and mouthfeel. If you're getting ready to brew the recipe in this article and you can't find Simcoe at 12%, don't worry about it. Simcoe at 10% or 14% is just fine. As long as the alpha acid range is somewhere in the ballpark, keep all the quantities the same as in the recipe. For most beer styles the bitterness to starting gravity ratio (IBU divided by OG) is somewhere between 0.3 and 0.7. A bitter beer like an American IPA would range around 1.0. For an imperial IPA, if your recipe's IBU/OG ratio isn't somewhere around 3.0+, then you're not adding enough hops.

One of the things to keep in mind is that you're trying to build an intense, but harmonious hop character. Combining random hop varieties can result in some weird flavors. Hop selection is flexible, but many aficionados of this style consider the citrusy and evergreen characteristics of American type hops a requirement. Columbus, Centennial, Simcoe, Chinook are all good choices. Lower alpha acid hops, such as Cascade are fine too, but you'll want to focus on the higher alpha acid hops. The higher alpha hops have characteristic resiny flavors and higher bittering potential, which will reduce the amount of hop vegetable matter that ends up in your kettle. When selecting hop varieties you can select as many varieties as you want, but try to make sure they're all grouped into no more than two hop flavor families. For example, select hops which all share citrusy and evergreen characteristics as their prominent attribute. Don't start mixing herbal, floral, spicy, citrus and evergreen all in one recipe.

To achieve an intense hop character, you can't be shy in the amount of hops you add or the timing of the additions. A 5.0-gallon (19-L) batch of beer requires around ¾ to 1 lb. (340 to 450 g) of hop pellets. As for timing of the additions, make sure you have some hops at the beginning of the boil, mid-way through the boil, at the end of the boil, and dry hop additions at the end of fermentation is important to proper flavor development.

The amount of hop material in the kettle and fermenter will be massive. You might want to scale up the 5-gallon (19-L) recipe in this article to 6 gallons (23 L) to get a finished 5 gallons (19 L), otherwise expect to end up with around 4 gallons (15 L) of finished beer.

Yeast selection is simple for this style. You want a yeast strain with a clean, neutral character and one that will attenuate well. My favorites are White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) and Fermentis Safale US-05. Other strains worthy of experimentation are White Labs WLP051 (California V), Wyeast 1272 (American Ale II) and Wyeast 2450 (Denny's Favorite 50).

Ferment this beer with plenty of healthy, clean yeast at a moderate temperature. I like to start fermentation around 67 °F (19 °C), slowly raising the temperature to 70 °F (21 °C) as the fermentation begins to slow. This helps control any hot, solvent-like notes in this higher than normal ABV beer. Ramping up the temperature as the fermentation begins to slow will help ensure complete attenuation. If you are a brewer that repitches yeast from one batch to another, do not reuse the yeast from this batch of beer. The high hopping level has considerable negative impact on yeast viability (as does the alcohol content of this beer), so it is better not to reuse this yeast.

One last tip: imperial IPAs are best consumed within the first couple months in order to fully enjoy the freshest, brightest, most intense hop character. BYO

Irish Red

Fritz Maytag, of Anchor Brewing fame, during a speech many years ago, explained how the "story" around something is a big part of the experience. An interesting tale can even make something taste better. It was an idea new to me at the time, but I'm a firm believer in the concept ever since I first heard it. Essentially, if you're excited about how something was made, you'll enjoy it more. I think the same thing goes for environment: a given beer tastes better the more you enjoy the environment. Drinking with good friends? Favorite music playing? The beer tastes better. I've also come to realize that beer names can have the same effect. This is why most breweries give their beers creative names, to evoke a positive response in the consumer.

Nearly a decade after I heard Fritz speak I was in Australia to attend the first Australian National Homebrewing Conference. A good friend took me to the Holgate Brewhouse in Woodend where I ran across a beer name that interested me, Big Reg Lager. "Ah," I thought to myself, "This must be named after some local hero? A dear friend of the brewer maybe? Probably a mountain of a man with a wild mass of flaming red hair. A big, friendly guy, named Reginald, but everyone called him 'Reg.'" I could almost see his kind face, his smile exposing one gold tooth, atop his massive shoulders. It was a wonderful beer and I enjoyed it immensely. The funny thing is, I later came to find out that they hadn't named it Big Reg. It was originally named Big Red Lager. The beer had won the 2008 Premier's Trophy for Best Victorian Beer in the Australian International Beer Awards. Somewhere along the line there was a mix up and their trophy was accidentally engraved "Big Reg Lager." Instead of worrying about it, they just changed the name of the beer. My imagined story of the heroic, barrel-chested Reg was lost, crushed on the cruel, rocky shores of a typo. Still a great beer, but with a different story. I wonder if I would have enjoyed it as much had I tried a "Big Red Lager." If you ask me, "Red" doesn't convey as much excitement as "Reg" and that got me thinking about how many different red beers and red beer styles are out there, such as Irish red ale.

Irish red ale is a balanced, easy-drinking pint, with a moderate malt character full of caramel and toasted notes. The deep reddish copper color comes from both crystal malt and a small dose of highly kilned grain, such as roasted barley. Despite a slightly sweet overall character, the highly kilned grain adds a touch of dryness to the finish and can add a very slight touch of roasted flavor too. Hop bitterness is evenly balanced, but the dark malt addition can make the beer seem a little more bitter than the IBU level would indicate. Hop flavor and aroma is often close to non-existent, but there are examples with a touch of hop character. This beer can be brewed as either an ale or lager, but either way the fermentation character should be relatively clean. The Beer Judge Certification Program (BJCP) style guide mentions a light buttery character being acceptable, but this beer really shouldn't have distinct buttery notes. Perhaps a better way to describe it is toffee-like. Toffee is often made with butter. If your Irish red turns out to have toffee notes, that would be an OK amount of butter. If your beer has a butter character, then that would be too much. Brewed as a lager, an Irish red should have a lager profile. Brewed as an ale, the beer will have some esters, but the ester profile should be very restrained and subtle, just enough so you know the beer was brewed as an ale. The higher alcohol examples might have a bit of alcohol warmth, but the focus should be on an easy

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IRISH RED
by the numbers

OG:	1.044–1.060
FG:	1.010–1.014
SRM:	9–18
IBU:	17–28
ABV:	4.0–6.0%

Irish Red Ale

(5 gallons/19 L, all-grain)

OG = 1.053 (13.2 °P)
FG = 1.014 (3.5 °P)
IBU = 25 SRM = 18 ABV = 5.2%

Ingredients

9.9 lbs. (4.5 kg) Crisp British pale ale malt or similar British pale ale malt
6.0 oz. (170 g) Great Western crystal malt (40 °L)
6.0 oz. (170 g) Great Western crystal malt (120 °L)
5.0 oz. (142 g) roasted barley (300 °L)
5.25 AAU Kent Golding pellet hops (1.05 oz./30 g at 5% alpha acid) (60 min.)
White Labs WLP004 (Irish Ale), Wyeast 1084 (Irish Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 153 °F (67 °C). Hold the mash at 153 °F (67 °C) until enzymatic conversion is complete. Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.6 L) and the gravity is 1.041 (10.3 °P). The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 66 °F (19 °C), let the break material settle, rack to the fermenter and aerate thoroughly. Pitch the yeast. Use 10 grams of properly rehydrated dry yeast, 2 liquid yeast packages, or make an appropriate yeast starter. Ferment the wort at 66 °F (19 °C). After fermentation is done, carbonate the beer from 2 to 2.5 volumes.

Extract with Grains Option:

Replace the British pale ale malt with 6.6 lb (3 kg) English pale ale liquid malt extract. I have used a couple of English-type liquid malt extracts with great results. Some shops sell extracts from 100% Maris Otter malt, which might be labeled English or British extract. Always choose the freshest extract that fits the beer style. If you can't get fresh liquid malt extract, it is better to use 5.3 lb. (2.4 kg) dried malt extract instead. The crystal malt I use is from Great Western Malting Co. The roasted barley comes from Briess Malt & Ingredients Co. Feel free to substitute any high quality malt of a similar flavor and color from a different supplier.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1 gallon (~4 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 6.5 gallons (24.6 L) and a gravity of 1.041 (10.3 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Follow remaining instructions for the all-grain version.

Eric the Red

(5 gallons/19 L, all-grain)

OG = 1.052 FG = 1.011
IBU = 29 SRM = 23 ABV = 5.2%

Ingredients

10 lbs. (4.5 kg) British pale ale malt (3 °L)
3.0 oz. (85 g) crystal malt (90 °L)
7.0 oz. (198 g) roasted barley (300 °L)
8 AAU Columbus hops (0.66 oz./19 g of 12% alpha acids) (60 mins.)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 dried yeast (1 qt./1 L starter for liquid yeasts)
1 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C) in 15 qts. (14 L) of water. Boil for 90 minutes, adding hops with 1 hour left in boil. Chill the wort rapidly to 66 °F (19 °C), let the break material settle, rack to the fermenter and aerate thoroughly. Pitch the yeast. Ferment at 66 °F (19 °C).

Eric the Red

(5 gallons/19 L, extract with grains)

OG = 1.052 FG = 1.011
IBU = 29 SRM = 23 ABV = 5.3%

Ingredients

1 lb. 6 oz. (0.62 kg) British pale ale malt (3 °L)
3.0 oz. (85 g) crystal malt (90 °L)
7.0 oz. (198 g) roasted barley (300 °L)
2.0 lbs. (0.91 kg) Muntons light dried malt extract
3.75 lbs. (1.7 kg) Muntons light liquid malt extract
8 AAU Columbus hops (0.66 oz./19 g of 12% alpha acids) (60 mins)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 dried yeast (1 qt./1 L starter for liquid yeasts)
1 cup corn sugar (for priming)

Step by Step

Steep crushed grains in 3 qts. (2.8 L) of water at 152 °F (67 °C) for 45 minutes. Combine "grain tea," dried malt extract and water to make 3 gallons (11 L) of wort. Boil 60 minutes, adding hops at beginning of boil and liquid malt extract for the final 15 minutes. Cool, transfer to fermenter and top up to 5 gallons (19 L). Pitch yeast. Ferment at 66 °F (19 °C).

Smithwick's is an Irish red ale brewed at the Smithwick's Brewery in Kilkenny, Ireland. It is one of Ireland's oldest ales and considered one of the classic examples of Irish red ale.

drinking pint. High levels of alcohol and alcohol flavors are not appropriate for this style.

I prefer British pale ale malt as the base for Irish red. It provides a nice biscuit-like malt character background. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuit and toasty flavors. If you're brewing with extract, your best choice is an extract made from British pale ale malt. Look for products labeled English pale, Maris Otter, or British-style malt extract. If you can't get it through your local homebrew shop, you can find it online from several retailers. If you use domestic two-row malt or extract made from it, you'll need to compensate with some additional specialty malts such as Munich, Biscuit or Victory®, but show restraint. For a 5-gallon (19-L) batch, add no more than 0.75 pound (0.34 kg) total.

For the caramel or toffee character in this beer, the obvious choice is caramel/crystal specialty malts. What isn't obvious is where the reddish-copper color comes from. While one might be tempted to go heavy on the caramel-type malts to get both caramel flavor and a reddish color, doing so would most likely result in too much caramel flavor and not enough color. The deep reddish copper color comes from a small dose of highly kilned grain that also adds to the dry finish of the beer. Dark roasted grain can quickly overwhelm this beer's flavor profile, so caution and precise measuring are important. In this beer style, you're looking for a balance of all flavor elements and being too bold in any one area will miss the mark.

Irish red ale generally has a medium-light to medium body. A single infusion mash around 153 °F (67 °C) strikes the proper balance between fermentable and non-fermentable sugars. For extract brewers, most light colored extracts will get you fairly close. If not, you can build a little more body without flavor impact by adding some dextrin-type malts to your steeping grains.

Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.4 and 0.6. You're trying to achieve a slightly sweet start to the beer, with a balanced overall character, and a slightly dry finish. Normally, a single addition at 60 minutes is all you need. If you want a beer with some hop character, a moderate later addition, say 0.5 ounce (14 g), around 20 minutes is acceptable. Hop choice for bittering and flavor is fairly flexible. Kent Goldings, Fuggle, Challenger, Target, Perle and Magnum all work well. Don't use citrusy or catty American-type hops.

This style can be fermented as either an ale or lager, though my preference is to brew it as an ale. Regardless, temperature control during fermentation is also very important. You want the beer to attenuate enough so that it doesn't have a sweet finish and you want to ferment it cold enough that any esters are restrained and the beer has a fairly clean character. While some commercial examples have a touch of diacetyl, keep any buttery flavors and aromas to an absolute minimum for the best results in competition.

Two great yeasts for brewing this style are White Labs WLP004 (Irish Ale) and Wyeast 1084 (Irish Ale). You can't go wrong with either product. Irish ale yeast provides the right low-ester profile but is only moderately attenuative. You'll need to pitch the proper amount of clean, healthy yeast and keep a close eye on fermentation temperatures to ensure good attenuation. If you choose to go the lager route, you can use any continental lager strain with acceptable results. BYO

Kölsch

KÖLSCH
by the numbers

OG:	1.044–1.050 (11–12.4 °P)
FG:	1.007–1.011 (1.8–2.8 °P)
SRM:	3.5–5
IBU:	20–30
ABV:	4.4–5.2%

My first time wandering the streets of Cologne was a magical moment. In between dramatic cathedrals and luscious chocolate factories, I slipped from one brewery/pub/restaurant to another sampling Kölsch, the beer of Cologne. The waiters (or Köbes as they are called) serve the beer in a tall, narrow 200-mL glass called a Stange. With each additional delivery, they make a mark on your beer coaster, indicating the number of beers you've been served and how much you owe when done. They continue to bring beer and make more marks around the perimeter of the coaster until you put the coaster on top of the glass to indicate you are finished. I sat in the first pub for quite some time, as I enjoyed watching the parade of marks march their way around the perimeter of the coaster like a formation of skinny ants.

Kölsch, according to the Kölsch Konvention, can only be called Kölsch if it is brewed in the Cologne metropolitan area. The Kölsch Konvention also demands that the beer must be pale in color, be top-fermented, hop-accentuated, highly attenuated and between 11 and 14 °P. Of course, as any good brewer knows, that still leaves considerable wiggle room. While the different breweries do produce beers with a range of character, it is interesting to note how small a range of characteristics they span even though the Konvention technically allows so much more.

In today's bold craft beer landscape, Kölsch is a relatively subtle beer. It is a very pale gold to a light gold color with a light grainy malt character and a soft mouthfeel. A few examples have a slight touch of malt sweetness up front, but all follow through with a crisp enough finish that the beer never really seems sweet. Hop bitterness ranges from medium-low to medium, usually resulting in an even balance. Drier beers may seem balanced a bit more bitter, and sweeter versions balanced even to very slightly sweet. Hop flavor and aroma are generally quite low to non-existent, but there are some examples where noble hop character is apparent. A mistake some brewers make is to take any mention of fruitiness in the Beer Judge Certification Program (BJCP) style guide and use that as carte blanche to brew really fruity beers. While there is some fruitiness, in most good examples it is very subtle. In Kölsch, fruitiness should be a character left more to the imagination rather than being outright obvious. When sampling your own Kölsch, if your first thoughts are about the fruity character, then it is way too much. The same can be said for sulfur. During cold fermentation, if activity is slow, the beer will end up retaining unacceptable levels of sulfur. Yes, you might find some sulfur in a few examples of the style, but I would argue that you won't find it in the best examples. Make sure your fermentation procedures minimize the production of fruity esters and sulfur.

I prefer a nice German Pilsner malt for brewing Kölsch. I have used other pale malts with acceptable results, but the light, grainy taste of high quality Pilsner malt is right on target for this style. That is all you need for a great Kölsch. You can enhance the malty flavors with a small addition of Vienna or light Munich malt, but keep the percentage to 5% of the grain bill or less. You don't want to overdo the clean, restrained malt flavors of this beer and you never want to add things like caramel malts. The sweetness and flavor of caramel malts will quickly overwhelm the intended light character of this style.

In the past, a number of sources suggested that Kölsch-style beers were made with a sizable portion of wheat malt, up to 20%. The current BJCP style guidelines correctly indicate that this is rare in authentic

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Kölsch

(5 gallons/19 L, extract)

OG = 1.048 (11.9 °P)
FG = 1.009 (2.3°P)
IBU = 25 SRM = 4 ABV = 5.1%

Ingredients

6.6 lb. (3 kg) Briess Pilsner liquid malt extract (2 °L)
0.25 oz. (113 g) Weyermann Munich or wheat liquid malt extract (optional)
5 AAU Hallertau pellet hops (1.25 oz./35 g at 4% alpha acids) (60 min.)
White Labs WLP029 (German Ale/Kölsch) or Wyeast 2565 (Kölsch) yeast

Step by Step

The all-grain version of this recipe uses a small amount of Vienna malt. While you can try steeping 0.5 lb (227 g) of Vienna malt, the problem is that it will add unconverted starch to your beer. It is better to omit it or use extract instead. I don't know of any Vienna malt extracts, so Munich or wheat extract is the best substitute. Many folks have a hard time sourcing 100% wheat or Munich extract (Weyermann is the only manufacturer I know of at this time making 100% Munich malt extract), with most being a blend around 50/50 or 60/40. However, all is not lost. Just count the non-Munich or non-wheat portion of the extract against the base malt. For example, if a recipe called for 1 lb (0.45 kg) of 100% Munich and you had a 50/50 blend instead, increase the amount of Munich extract to 2 lb. (0.9 kg) and lower the base malt amount by 1 lb (0.45 kg).

Mix enough warm, chlorine-free water and the malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.041 (10.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil. The total wort boil time is 60 minutes. Add the bittering hops once the wort begins to boil. Add Irish moss or other kettle finings with 15 minutes left. Chill the wort rapidly to 60 °F (16 °C), let the break material settle, rack to the fermenter and aerate thoroughly.

Use 2.5 liquid yeast packages or make a starter with fewer packages. Ferment at 60 °F (16 °C). Allow the beer to lager for at least four weeks before bottling or serving. When finished, carbonate the beer to approximately 2.5 volumes and serve at 50 °F (10 °C).

Kölsch

(5 gallons/19 L, all-grain)

OG = 1.048 (11.9 °P)
FG = 1.009 (2.3 °P)
IBU= 25 SRM = 4 ABV = 5.1%

Ingredients

9.25 lb. (4.2 kg) Durst Pilsner malt (2 °L)
0.5 lb. (227 g) Weyermann Vienna malt (4 °L)
5 AAU Hallertau pellet hops (1.25 oz./35 g at 4% alpha acids) (60 min.)
White Labs WLP029 (German Ale/Kölsch) or Wyeast 2565 (Kölsch) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.6 L) and the gravity is 1.037 (9.3 °P).

The total wort boil time is 90 minutes, which helps reduce DMS levels in the beer. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 60 °F (16 °C), let the break material settle, rack to the fermenter and aerate thoroughly.

Use 2.5 liquid yeast packages or make a starter with fewer packages. Ferment at 60 °F (16 °C). Allow the beer to lager for at least 4 weeks before bottling or serving. When finished, carbonate the beer to approximately 2.5 volumes and serve at 50 °F (10 °C).

Kölsch can only truly be called "Kölsch" if it is brewed in the city of Köln, Germany, such as Reissdorf Kölsch, which is brewed at Brauerei Heinrich Reissdorf.

Kölsch is traditionally served in narrow 200-mL glasses called "Stange" glasses. When enjoying Kölsch in Köln, Germany, each time you are served a fresh glass of Kölsch the bartender marks a line on your coaster. When you are finished, you put the coaster on top of your glass and your Stange count is tallied up for your bill.

"Fermentation temperatures around 58 to 62 °F (14 to 17 °C), depending on strain used, is a good range. One thing about most Kölsch yeasts is that they do not flocculate easily. It can take quite a bit of time, finings or filtering to clear the beer."

Kölsch. A small portion of wheat malt is OK; the same as adding Vienna malt. Wheat can add a gentle bready note to the beer and can improve head retention. Overall, try to keep it simple. Limit yourself to no more than one grain in addition to the base malt and keep that to no more than 5% of the grist. A single infusion mash around 149 °F (65 °C) strikes the proper balance between fermentable and non-fermentable sugars.

Extract brewers can use a Pilsner-like malt extract, although in a pinch any light colored extract will suffice. Most light colored extracts will attenuate fairly well, but try to avoid any extract that won't attenuate in the vicinity of 80% apparent attenuation. There are several good Pilsner or Pilsner-type extracts out there, so finding one should not be too difficult for most brewers.

Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.4 and 0.6. You're trying to achieve an even or very slightly sweet start to the beer, with a balanced overall character, and a slightly dry finish. Normally, a single addition at 60 minutes is all you need. If you want a beer with some hop character, a moderate later addition, say ½ ounce (14 g) 20 minutes or later is acceptable. Hop choice for bittering and flavor is fairly flexible. Ideally, stick with German noble hops Hallertau, Tettnang, Spalt or Hersbrucker. If you're having trouble sourcing those, any German hop will work as will US versions of traditional German hops. Overall, think German lager hop character, not West Coast pale ale character. Never use citrusy or catty American-type hops.

Yeast selection and fermentation temperature control is very important. It is impossible to get the right flavor and aroma without the right yeast at the right temperature. You want the beer to attenuate enough so that it doesn't have a sweet finish and you want to ferment it cool enough that any esters are restrained and the beer has a fairly clean character. Two great yeasts for this style are White Labs WLP029 (German Ale/ Kölsch) and Wyeast 2565 (Kölsch). You can't go wrong with either product. These yeasts provide the right, low-ester profile and proper attenuation for a dry enough finish. You'll still need to pitch the proper amount of clean, healthy yeast and keep a close eye on fermentation temperatures to ensure good attenuation and flavor development. Fermentation temperatures around 58 to 62 °F (14 to 17 °C), depending on strain used, is a good range. One thing about most Kölsch yeasts is that they do not flocculate easily. It can take quite a bit of time, finings or filtering to clear the beer. If you're patient, the easiest way to clear the beer is to lager it near freezing for a month or more.

Kölsch's delicate character won't hide flaws, like oxidation or poor fermentation practices. Pay strict attention to sanitation, yeast health, and treat your beer gently during transfers. After lagering and as soon as the beer reaches its peak of flavor, it is time to start thinking about consuming the beer fairly quickly. Kölsch is best served fresh and around cellar temperature. A tall, narrow, straight-sided glass, it will make a difference in your perception of the beer as well. BYO

Maibock

I have always been a fan of German-style lagers. In fact, my love of the always-present clean malt character in these beers is what made me choose the nickname Mr. Malty. Everything from the crisp Pilsners to the rich bocks relies on clean, bready malt character (not necessarily malt sweetness) as a critical component of these styles.

Maibock (also known as Helles bock) is in the middle of the German style pack. It has that rich continental malt character, both in flavor and aroma, but it is never overly sweet. It has a moderately dry finish, leaving an impression of dough-like, grainy or even slightly toasty malt character. There is a hint of malt sweetness, but it is often balanced with light hop bitterness and enough attenuation to make it easy to drink a liter. A Maibock should always be brilliantly clear with a golden hue and the body should be medium. Any alcohol should be smooth and slightly warming, never hot or solvent-like. The fermentation character is clean, and very low in esters.

Maibock is also somewhat in the middle when it comes to hop bittering and character. The bittering is more balanced than in the other bock styles, which tend to have a sweeter balance. The hop flavor and aroma is higher in Maibock than the other bock styles as well, but not as high as you might find in a German Pilsner. The hop aroma, if present, is subtle and has a spicy or sometimes floral quality. In the past some people believed that there was a difference between Helles bock and Maibock, with one being slightly hoppier and higher alcohol than the other. Today most people consider the names to be synonymous.

A great recipe is relatively simple, but many brewers try to make it much more complex in an effort to increase malt character. The best way to achieve that great German lager malt character is with high-quality, full-flavored base malts and excellent fermentation practices. I would never attempt to make a Maibock without using continental Pilsner malt. In addition, a good portion of the grist should be Vienna or Munich malt, which adds to the rich malt character. Anywhere from ¼ to ½ of the grist can be Vienna or Munich — but don't go overboard . . . too much Munich can cause the color to lean more toward orange than golden. With those basic malts you should be able to make an excellent example of the style, but if you must, you can add other malts as well, such as head and body forming dextrin malts. I have seen some recipes calling for crystal malts, but those are inappropriate in this style. Unlike the other bock beers, this style is best brewed without caramel malt. Caramel malt adds the wrong flavor and sweetness. You want some residual sweetness, but more of a base malt sweetness than a caramelized sweetness. Trust that the higher starting gravity and mash technique will leave just the right touch of sweetness, which will not be nearly as heavy as adding caramel malt.

Extract brewers will need to use some Munich extract or do a partial mash with Munich or Vienna malt. Most Munich malt extract is sold as a blend of Munich and Pilsner (or other pale malts) in different percentages. I specify 100% Munich liquid malt extract (LME) in my recipes so you will know which blend to use for your brew. If you use a blend with a higher percentage of Munich than the recipe you are brewing, you can always add some Pilsner extract to reduce the overall amount of Munich in the beer. That said, most Munich extract blends are often close enough for a decent Maibock without any adjustment. The only supplier of 100% Munich extract that I am aware of is Weyermann.

I like to avoid any work that I don't feel improves the beer, so I pre-

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MAIBOCK
by the numbers

OG:	. . .1.064–1.072 (15.7–17.5 °P)
FG:	. . . . . .1.011–1.018 (2.8–4.6 °P)
SRM:	6–11
IBU:	23–35
ABV:	. . . . . .6.3–7.4%

Maibock

(5 gallons/19 L, all-grain)

OG = 1.070 (17.1 °P)
FG = 1.017 (4.3 °P)
IBU = 27 SRM = 7 ABV = 7.1%

Ingredients

9.3 lb. (4.2 kg) Best Malz Pilsen or similar continental Pilsner malt (2 °L)
5.1 lb. (2.3 kg) Best Malz Munich malt (8 °L) (or similar)
5.85 AAU Magnum hops (0.45 oz./13 g at 13% alpha acids) (60 min.)
White Labs WLP833 (German Bock Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete, which may take 90 minutes or more at this low temperature. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.054 (13.4 °P).

The total wort boil time is 90 minutes, which helps reduce the S-methyl methionine (SMM) present in the lightly kilned Pilsner malt and results in less dimethyl sulfide (DMS) in the finished beer. Add the first hop addition with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. While the recipe does not call for it, you can optionally add another 0.42 oz (12 g) of Hallertau hops at 10 minutes left in the boil to enhance the hop character. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 500 billion cells, which is 5 packages of liquid yeast or one package of liquid yeast in a 15-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

Maibock

(5 gallons/19 L, extract)

OG = 1.070 (17.1 °P)
FG = 1.017 (4.3 °P) IBU = 27
SRM = 7 ABV = 7.1%

Ingredients

6.6 lb. (3 kg) Pilsner liquid malt extract (2 °L)
3.3 lb. (1.5 kg) Munich liquid malt extract (9 °L)
5.85 AAU Magnum hops (0.45 oz./13 g at 13% alpha acids) (60 min.)
White Labs WLP833 (German Bock Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Always choose the freshest extract that fits the beer style. If you can't get fresh liquid malt extract, it is better to use an appropriate amount and variety of dried malt extract instead. Add enough water to the malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and the gravity is 1.059 (14.6 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Brauerei Aying in Aying, Germany, brews a classic example of Maibock.

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the first hops. Add Irish moss or other kettle finings with 15 minutes left in the boil. While the recipe does not call for it, you can optionally add another 0.42 oz (12 g) of Hallertau at 10 minutes left in the boil to enhance the hop character. Chill the wort to 50 °F (10 °C) and aerate thoroughly. The proper pitch rate is nearly 500 billion cells, which is 5 packages of liquid yeast or one package of liquid yeast in a 15-liter starter.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but do not rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last few days of active fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will improve the beer. Serve at 43 to 46 °F (6 to 8 °C).

fer a single infusion mash. Perhaps, historically, a brewer would use a decoction mash when brewing most German-style beers, but I find that high quality continental malts, a single infusion mash and excellent fermentation practices will produce beer every bit as good as the best commercial examples. It is far more important to invest time and effort in fermentation, sanitation, and post fermentation handling than decoction. If you have ensured that all of those other aspects of your process are flawless, then decoction might be something of interest. For a single infusion mash, target a mash temperature range of 152 to 156 °F (67 to 69 °C).

Hops can be a bit more apparent in Maibock than other bock styles, but it is still fairly restrained with the hop flavor and aroma acting as subtle background notes. Hop bitterness is also slightly higher in this style, but again it requires restraint — just enough to balance the malt sweetness. I really like using German-grown Hallertau hops for flavor and aroma, though sometimes they are hard to source. Other German-grown hops, such as Tettnang, Perle or Tradition, work well also. These hops, when grown outside of Germany, can still work well but you should check with your supplier first if you are not sure how closely they match the German grown hops. If you cannot get any of those varieties of hops, you do have some flexibility.

The trick is to select hops with that same flowery or spicy noble hop character. You do not want to use anything fruity or citrusy. Some decent substitutions are Liberty and Mt. Hood. You can also try Crystal, Ultra and Vanguard. It is really the overall impression that matters. The big picture is that you want very low hop character and just a balancing bitterness, with both complementing and integrating with the malt. The balance of bittering versus malt sweetness should always be close to even. The bitterness to starting gravity ratio (IBU divided by the decimal portion of the specific gravity) ranges from 0.3 to 0.6, but I like to target around 0.4. Restrict your late hops to small additions. In general, 0.5 oz. (14 g) during the last 10 minutes of the boil for a 5 gallon (19 L) batch is the most you can use without overdoing the hop character. If the beer is going to lager for a long time before drinking, then you might get away with a little more.

You can ferment Maibock with almost any lager yeast, though my favorites are White Labs WLP833 (German Bock Lager) and Wyeast 2206 (Bavarian Lager). You will find that each lager yeast will emphasize different aspects of the beer. Some will have more malt character and some more hop character, but all can produce an excellent bock with proper fermentation.

While this style is a bit higher in alcohol than most lagers, the beer should never be hot or solvent-like. A gentle warming when you drink the beer is OK, but anything more is considered a flaw. It is important to control the fermentation temperature and to pitch plenty of clean, healthy yeast.

When making lagers, I like to chill the wort down to 44 °F (7 °C), oxygenate, and then pitch my yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) and then I hold this temperature for the remainder of fermentation. If fermentation seems sluggish at all after the first 24 hours, I am not afraid to raise the temperature a couple degrees more. The idea is to reduce the diacetyl precursor alpha-acetolactate, which the yeast create during the early phase of fermentation. Once the growth phase of fermentation is complete, it is important that fermentation be as vigorous as possible. It may never be as robust as fermentation at ale temperatures, but it is important to have enough activity to blow off aromatic sulfurs and other unpleasant compounds. Vigorous yeast activity at the end of fermentation also improves reduction of compounds such as diacetyl. Starting fermentation colder only works well if you are pitching enough clean, healthy yeast at the start. If not, you will need to start warmer (perhaps 55 °F/ 13 °C) to encourage more yeast growth. Even if you start fermentation warmer, you can still raise the temperature toward the latter part of fermentation.

Since diacetyl reduction is slower at colder temperatures, a cold fermented lager may require a diacetyl rest. To perform a diacetyl rest, simply raise the temperature into the 65 to 68 °F (18 to 20 °C) range for a two-day period near the end of the fermentation. While you can do a diacetyl rest after the fermentation reaches terminal gravity, a good time for a diacetyl rest is when fermentation is 2 to 5 specific gravity points (0.5 to 1 °P) prior to reaching terminal gravity. Brewers often ask how they should know when fermentation has reached that stage — my advice is to raise the fermentation temperature for a diacetyl rest as soon as you see fermentation activity significantly slowing. It will not hurt the beer and it should help the yeast reach complete attenuation as well.

This beer improves with some period of cold conditioning. Traditional lager conditioning utilizes a slow temperature reduction before fermentation reaches terminal gravity. The purpose of the slow cooling rate is to avoid sending the yeast into dormancy. After a few days, the beer reaches a temperature close to 40 °F (4 °C) and the brewer transfers the beer into lagering tanks. If you want to use this technique, you will need precise temperature control so that fermentation slowly continues and the yeast remains active. Rapidly chilling the beer near the end of fermentation can cause yeast to excrete a greater amount of ester compounds instead of retaining them.

When I brew this style I prefer to wait until fermentation is complete, including any steps such as a diacetyl rest, before lowering the beer temperature. The yeast is far more active and able to reduce fermentation byproducts at higher temperatures. Once I am certain the yeast have completed every job needed, I use a period of cold storage near freezing. This time in storage allows very fine particulates to settle out and the beer flavors to mature. BYO

Munich Dunkel

MUNICH DUNKEL
by the numbers

OG:	1.048–1.056 (11.9–13.8 °P)
FG:	1.010–1.016 (2.6–4 °P)
SRM:	14–28
IBU:	18–28
ABV:	4.5–5.6%

I love technology, but there are times when going "old school" is just better. I could write these columns using the latest computer software, but I like to write them with pencil and paper while enjoying a pint in some wonderful spot. There is something about writing a little slower and sipping a pint, doing it old school, which makes the article better, right? At least it makes the process of writing more enjoyable.

The funny thing is, there are some beer styles that feel old school, regardless of how they are produced. Munich dunkel is one of those beer styles. It isn't light, fizzy, and near colorless. It is dark with gemstone highlights and rich with bready malt flavors. When I drink a fine Munich dunkel, I get the feeling, right or wrong, that the brewery must have been producing this style of beer for many years, if not many centuries.

Munich dunkel is the maltiest style in the Beer Judge Certification Program (BJCP) Dark Lager category. It is a beer full of toasted bread and other malt flavors and aromas from the heavy use of melanoidin-rich Munich malt. Most good examples are balanced nearly even, leaning a little to the sweet side, which hides the restrained hop bitterness. However, it is never overly sweet, heavy, or as intensely malty as bock-style beers. While schwarzbier will often have a slight roast note, Munich dunkel should never be roasty. Munich dunkel is also lighter in color than schwarzbier, ranging from deep copper to dark brown.

Hop character in this style is restrained. A touch of hop flavor or aroma is acceptable, but it should be no more than a subtle complement to the overall beer.

I've seen some excessively creative recipes for Munich dunkel, including everything from molasses and honey to roasted barley and wheat malt. Then there are other recipes that use half Munich malt, half Pilsner malt and a substantial amount of CaraMunich®. The CaraMunich® adds a caramel sweetness that some people may enjoy, but I find it completely out of place in this style. Even moderate amounts of CaraMunich® result in a beer more like a bock than a Munich dunkel. The best Munich dunkel that I've had was made from a simple recipe. Munich dunkel is a beer rich in malty flavors, but it does not require a complex recipe.

The key to brewing Munich dunkel is using a very high percentage of Munich malt. Munich malt provides all of the rich malty flavors and aromas that the beer needs. Some of the best commercial examples are made entirely from Munich malt and a dash of Weyermann Carafa® Special for coloring. The question many all-grain brewers have is what color Munich malt? Maltsters produce varying colors of Munich malt, from a low of 6 °L to a high of 20 °L or more. Generally, the darker the Munich malt the more intense the rich melanoidin flavors and aromas. I've heard some brewers report good results using dark Munich malt, around 20 °L. However, I'm not sure if that is the best choice, as the flavors can be too intense when that is the bulk of the grist. It is not good to use too light a Munich malt either. I prefer Munich malt in the 8 to 12 °L range, which gives plenty of melaniodin rich character, but not so much that it becomes overwhelming. Another factor in choosing Munich malt is the source. When brewing German-style beers, I prefer using malts from German maltsters. While there are excellent products made elsewhere, there is something comforting about using German malt for a German beer style. When purchasing European malts, be aware that the color listed on the bag is often in degrees EBC, which is roughly twice the Lovibond scale.

By itself most Munich malt results

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Old School Dunkel

(5 gallons/19 L, all-grain)

OG = 1.054 (13.4°P)
FG = 1.014 (3.6°P)
IBU = 23 SRM = 20 ABV = 5.3%

Ingredients

11.0 lb. (5 kg) Durst or Weyermann Munich Malt (8 °L)
5.0 oz. (142 g) Weyermann Carafa® Special II (huskless) (430 °L)
4 AAU Hallertauer pellet hops (1.0 oz./28 g at 4% alpha acids) (60 min.)
2 AAU Hallertauer pellet hops (0.50 oz./14 g at 4% alpha acids) (20 min.)
White Labs WLP833 (German Bock Lager), Wyeast 2308 (Munich Lager) or Fermentis Saflager S-23 yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22.3 L) and the gravity is 1.046 (11.44 °P).

Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. Add the flavor hops with 20 minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 50 °F (10 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate. Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less. If desired, perform a diacetyl rest during the last ⅓ of fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 2 to 2.5 volumes. Cold conditionin for a month or more at near freezing temperatures. Serve at 43 to 46 °F (6 to 8 °C).

Old School Dunkel

(5 gallons/19 L, extract with grains)

OG = 1.053 (13.3 °P)
FG = 1.014 (3.5 °P)
IBU = 23 SRM = 19 ABV = 5.3%

Ingredients

7.5 lb. (3.4 kg) Weyermann 100% Munich liquid malt extract
5.0 oz. (142 g) Weyermann Carafa® Special II (huskless) 430 °L
4 AAU Hallertauer pellet hops (1.0 oz./28 g at 4% alpha acids) (60 min.)
2 AAU Hallertauer pellet hops (0.50 oz./14 g at 4% alpha acids) (20 min.)
White Labs WLP833 (German Bock Lager), Wyeast 2308 (Munich Lager) or Fermentis Saflager S-23 yeast.

Step by Step

To make an all-extract version, substitute the Weyermann Carafa® Special with 2.5 oz. (71g) by weight of SINAMAR® extract.

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in 1/2 gallon (~2 liters) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle (don't squeeze) for a few minutes while you add the malt extract. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.046 (11.35 °P). Stir thoroughly and bring to a boil. Once the wort is boiling, add the bittering hops. The total wort boil time is 1 hour after adding the bittering hops. Add the flavor hops with 20 minutes remaining and Irish moss or other kettle finings at 15 minutes. Chill the wort to 50 °F (10 °C), pitch the yeast and aerate thoroughly. Follow the remaining instructions for the all-grain version.

Simple Mash Option:

Use 11.0 lb (5 kg) Munich malt instead of the Munich malt extract. Crush the Munich malt and Carafa® Special and put it in a large mesh bag. Heat 1.5 quarts of water per pound of grain (~1.5L) to 163 °F (73 °C) and immerse the grain bag. Gently stir the grain inside the bag with a large spoon to make sure it is wet throughout and check the temperature. The grain and water (the mash temperature) should now be around 152–156 °F (67–69 °C). If not, add a boiling water to the pot to warm it up or cold water to cool it down. Let the mash sit for a half hour. Add more heat by adding boiling water to get the temperature back up in the desired range. Let mash sit for another half hour. At that time, the starches in the Munich malt should have converted to sugars. The liquid in the pot should taste sweet. Heat 2 gallons (8 L) of water in your boiling pot to 165 °F (74 °C). Lift the bag out of the first pot and let it drain for a minute before transferring the grain and bag into the water in the other pot. Let the bag sit in the pot for at least 10 minutes, agitating the bag to rewet the grain and rinse out the sugars. Lift the bag, let it drain and discard the grain. Add the wort from the first pot, adjusting the total volume of pre-boil wort by adding water. Mix well and take a gravity reading. If it's low, add DME to bring the gravity up and you're ready to boil.

in a beer color that is on the light end of the style. The darkest Munich malts produce the right color, but if you don't like the flavor profile of those darkest malts, you will still need to darken the color of your Munich dunkel without adding roasty flavors. The proper method is to use dehusked black malt. My preference is for Weyermann Carafa® Special, a huskless, roasted malt. The lack of a husk means far less bitter roasted flavors. Carafa® Special comes in several color levels: Carafa® Special I (340 °L), II (430 °L), and III (530 °L). I prefer the flavor of Carafa® Special II for this style, although the other colors will work fine in a pinch. Weyermann also makes Carafa®, which does have a husk and a lot more roasted character, so make sure you're getting the huskless variety, Carafa® Special. Weyermann also makes SINAMAR®, a liquid extract of Carafa® Special, made in accordance with the Reinheitsgebot. It is easy to use and provides as good a result as using the grain itself. Just add it to the boil kettle. One ounce by weight (28 g) of SINAMAR® in 5 gallons (19 L) of liquid adds 6 SRM of color and little in the way of roasted flavor. The only problem with SINAMAR® is that it is a bit harder to find at most homebrew shops than Carafa® Special.

Extract brewers must find Munich extract for this beer. Many Munich malt extracts are often a blend of Munich and Pilsner or two-row malt. As long as the flavor is rich and full of bready malt notes a blended Munich extract may be acceptable, but it is worth the trouble to ask your local homebrew shop owner about ordering 100% Munich extract. What about steeping Munich malt? Unfortunately, steeping Munich malt adds unconverted starch to your wort, which can result in haze and other problems in your beer. Luckily, most Munich malts will self-convert if held at saccharification temperature. Perhaps this is a great opportunity to venture into creating your own wort from grains or partial mashing some Munich malt along with a 60/40 Munich extract. All it takes is paying attention to the water/grain ratio and holding the mash in the proper temperature range. Yes, messing with the pH of the mash can help, but it isn't critical for your first time and most tap water will work just fine. Other than that, the rest of the process is very similar to steeping grains.

> "A touch of hop flavor or aroma is acceptable, but it should be no more than a subtle complement to the overall beer."

Historically, a brewer would use a decoction mash when brewing a Munich dunkel. While a decoction mash might induce more Maillard reactions, I find that with all of the rich malt flavors provided by today's Munich malts, a single infusion mash works well for this style. Target a mash temperature range of 152 to 156 °F (67 to 69 °C) and keep in mind that Munich malt already makes a wort slightly less fermentable than wort made with pale Pilsner malt. Generally, the darker the Munich malt the less fermentable the wort. If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more body. If you are making a bigger beer, use the lower end of the range to avoid too full of a body, which can limit the drinkability.

You can ferment Munich dunkel with any number of German lager yeasts. My preference is White Labs WLP833 (German Bock) as it makes a beer most similar to my favorite commercial example, Ayinger Altbairisch Dunkel. Good alternatives to experiment with from Wyeast are 2308 (Munich) and 2206 (Bavarian Lager). Good alternatives from White Labs include WLP838 (South German), WLP820 (Oktoberfest/Märzen) and WLP830 (German Lager Yeast). You could also try Fermentis Saflager S-23.

You will need around 375 billion clean, healthy cells to properly ferment 5 gallons (19 L) of this beer, which is double what you would normally use for an equivalent strength ale. For a simple, non-stirred starter, one package of liquid yeast in 2.3 gallons (8.7 L), or 2 packages in 3.7 quarts (3.5 L), will result in the right amount of yeast. If you're not making a starter, you'll need about 4 packages of liquid yeast. If you're using dry yeast, use approximately ¾ ounce (21 g) of fresh, properly rehydrated yeast.

When making lagers, I like to get the wort down to 44 °F (7 °C), oxygenate and then pitch the yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) for the remainder of fermentation. This results in a clean lager, with very little diacetyl. This is similar to a Narziss fermentation, where the first two-thirds of the fermentation is done cold and the final third is done warmer. The idea is to reduce the diacetyl precursor alpha-acetolactate, which is created during the early phase of fermentation. With a warmer environment, more precursors are formed and more diacetyl is created from those precursors. Yeast will usually convert some of the diacetyl to flavorless compounds, but the lower the initial amount of diacetyl, the less there will be in the final beer. If you start or ferment your lager warmer, you'll need to do a diacetyl rest during the last ⅓ of fermentation. To perform a diacetyl rest, warm your beer up about 10 °F (6 °C) until fermentation is complete and the yeast have had a chance to eliminate the diacetyl. In any case, don't rush things. Good lagers take time and they ferment slower than ales, especially when fermented cold. Once the beer has finished fermenting, a period of lagering for a month or more at near freezing temperatures can improve the beer.

Give this style a try — maybe you'll feel a little old school yourself! BYO

Russian Imperial Stout

Russian imperial stout was one of the first beer styles that caught my interest. I remember tasting North Coast Old Rasputin as I read and reread the Beer Judge Certification Program (BJCP) style guidelines for the style. I also liked the idea that this was, according to the Courage Brewery, the beer of "Catherine II, Empress of all the Russias" as far back as the late 18th century. How cool is that?

There are two variants of the style, English and American. As you might expect, the American versions are bolder, cleaner and often feature American hops. The English versions are more complex and feature more fermentation character. No matter what the variant, Russian imperial stout is as big, rich, and intensely flavored as a stout can be. A good version of this beer needs to have a big roasted malt character that is reminiscent of coffee, dark chocolate and even tar-like notes. There should also be dark fruits, hops, and warming alcohol, although the alcohol should never be hot or harsh.

Russian imperial stout ranges from dark reddish-brown to jet black. The overall balance is often bittersweet, though some examples might be more bitter and others might be more sweet. Regardless, there is always some sweetness to help balance the substantial bitterness of the roasted grains and hops. The finish ranges from sweet to dry, though the best examples finish closer to balanced. While this is a full-bodied, creamy beer, it should not be syrupy-thick or cloying. Fruity esters range from low to medium-high. It can be a variety of esters, but the ones that really seem to fit well with the style are dark, dried fruit flavors such as raisin, prune and fig.

Late hop character in this style varies from substantial hop character to relatively little. Of course, the amount of hop character present depends on aging. Young samples tend to be hoppy, while aged beers have progressively less hop character over time.

While this style has a substantial amount of alcohol, it should never be hot or solventy. This is one of the most common mistakes brewers make when brewing a big beer.

You have some flexibility in choosing base malt for Russian imperial stout. Using North American two-row gives the beer a clean, subtle, background-malt character common to many American craft beers. Using North American pale ale malt adds a slightly richer background malt character, somewhat of a light bready note. Again, this is the type of malt character found in many fine North American craft brews. I prefer British pale ale malt for the base. British pale ale malt provides an even greater depth of malt character to the beer, mainly a biscuit-like taste and aroma common in many British beers. In a beer this big and bold, it can handle the extra malt character of British pale ale malt. Extract brewers can use an English pale ale extract if they want a richer malt background or a light color North American malt extract if they want a more subtle taste. All-grain brewers should use a single infusion mash and a low enough mash temperature so that the resulting beer does not end up too viscous. A temperature range of 149 to 154 °F (65 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or very high starting gravities. Use a higher temperature when using the higher attenuating yeasts or lower starting gravity beers.

Even when using British pale ale malt for the base grain, the majority of the character that defines Russian imperial stout comes from specialty malts. A traditional British recipe would utilize a fairly simple recipe such as pale, amber and black malts, plus some sort of simple sugar.

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RUSSIAN IMPERIAL STOUT
by the numbers

OG:	1.075–1.115 (18.2–26.9 °P)
FG:	1.018–1.030 (4.6–7.6 °P)
SRM:	50–90
IBU:	50–90
ABV:	8.0–12%

The Czar's Revenge

(5 gallons/19 L, extract with grains)

OG = 1.098 (23.4 °P)
FG = 1.030 (7.5 °P)
IBU = 77 SRM = 61 ABV = 9.2%

Ingredients

11.4 lb. (5.17 kg) Muntons or similar pale English liquid malt extract
22 oz. (624 g) Great Western roasted barley (500 °L)
14 oz. (397 g) Dingemans Special B (120 °L)
8 oz. (227 g) Briess caramel Munich (60 °L)
7 oz. (198 g) Briess chocolate malt (350 °L)
7 oz. (198 g) Crisp pale chocolate malt (200 °L)
15.99 AAU Horizon hops (1.23 oz./35 g at13% alpha acids) (60 min.)
8.3 AAU Kent Goldings hops (1.66 oz./47 g at 5% alpha acids) (10 min.)
8.3 AAU Kent Goldings (1.66 oz./47 g at 5% alpha acids) (1 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 yeast

Step by Step

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1.5 gallon (~6 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.084 (20.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 60 minutes. Add the bittering hops as soon as the wort begins to boil. Add Irish moss or other kettle finings with according to the recipe's hop schedule. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 16 grams of properly rehydrated dry yeast, three packages of liquid yeast or one package of liquid yeast in a 6-liter starter.

Ferment at 67 °F (19 °C) until the yeast drops clear. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 2 to 2.5 volumes. Store the beer in a cool, dark place and allow to age six or more months before drinking.

The Czar's Revenge

(5 gallons/19 L, all-grain)

OG = 1.098 (23.4 °P)
FG = 1.030 (7.5 °P)
IBU = 77 SRM = 61 ABV = 9.2%

Ingredients

17 lb. (7.71kg) Crisp British pale ale malt or similar (3 °L)
22 oz. (624 g) Great Western roasted barley (500 °L)
14 oz. (397 g) Dingemans Special B (120 °L)
8 oz. (227 g) Briess caramel Munich (60 °L)
7 oz. (198 g) Briess chocolate malt (350 °L)
7 oz. (198 g) Crisp pale chocolate malt (200 °L)
15.99 AAU Horizon hops (1.23 oz./35 g at13% alpha acids) (60 min.)
8.3 AAU Kent Goldings hops (1.66 oz./47 g at 5% alpha acids) (10 min.)
8.3 AAU Kent Goldings (1.66 oz./47 g at 5% alpha acids) (1 min.)
White Labs WLP001 California Ale, Wyeast 1056 American Ale or Fermentis Safale US-05

Step by Step

Mill the grains and dough-in targeting a mash thickness that will enable your system to achieve the necessary pre-boil volume and gravity. Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.076 (18.4 °P). If your system loses efficiency on big beers, start with an additional 4 to 5 lbs. (2 kg) of base malt or make sure you have a couple of pounds (1 kg) or more of malt extract on hand to make up any deficiency in efficiency.

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with according to the recipe's hop schedule. Chill the wort to 67 °F (19 °C) and aerate thoroughly. The proper pitch rate is 16 grams of properly rehydrated dry yeast, three packages of liquid yeast or one package of liquid yeast in a 6-liter starter. Ferment at 67 °F (19 °C) until the yeast drops clear. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 2 to 2.5 volumes. Beer will improve over time and should mature six or more months before drinking.

However, this is such a big, rich style with so many variations that there is plenty of room for playing with other specialty grains and rich malt flavors.

Every Russian imperial stout needs roasted malt notes and many examples include caramel malt notes also. The roast, chocolate and coffee character of the style comes from the use of highly kilned grain. I use roasted barley, but the word is that some traditional commercial examples use black malt. A range of 7 to 20% of the grist should be highly kilned grains. Keep in mind that beers at the higher end of the range are somewhat acrid when young and will require considerable aging time. A 50/50 mix of highly kilned and lighter kilned grain, like roast barley and chocolate malt, strikes a nice balance of sharper roasted notes and less burnt coffee/chocolate notes. For caramel flavors, I always use dark crystal (80–150 °L) as it adds those caramelized, raisin-plum notes that go so well in this style. I also likely to include some mid-color crystal (40–60 °L), which adds some caramel flavors and some residual sweetness to help balance the bitterness of the roast grains and hops. Even though you have a lot of leeway, you do not want to add a lot of low color crystal malt (< 30 °L), as it adds sweetness without much caramel character. Also, watch the total amount of crystal malt in your recipe. If the total amount exceeds 10% of the grist, it can result in an overly sweet and heavy beer.

If you are looking for more complexity or increased head retention it is possible to add other malts as well. Wheat malt, Victory®, Munich and more are common additions in many recipes. Just use restraint so the beer does not become saturated with unfermentable dextrins or cloying flavors. Target between 0 and 5% for these additional specialty grains.

Traditional British commercial examples most likely include some simple sugar, which boosts the alcohol without increasing the body or malt character. Sugar isn't really a requirement, although it can be a useful tool if you're having trouble reaching a proper level of attenuation. In which case, replacing a small portion of the base malt with sugar can help the beer finish a bit drier.

Hop flavor and aroma also varies from minimal to bold. In any interpretation, late hop additions are acceptable, but you need to have some idea of when you will be drinking the beer. The longer the period before drinking, the more the late hops will fade. If you want late hop character a couple years down the road, you will need big late hop additions. Typical hop additions for this style are British or American varieties. You do have plenty of leeway when making your hop choices, including hops from the southern hemisphere. Almost anything is fair game as long as you do not try to build a big German noble hop character or something along those lines. When targeting more of an American interpretation, I like using citrusy or piney American variety hops such as Cascade, Centennial, Columbus and Amarillo® for flavor and aroma. For more of a traditional interpretation, any British hop is fine as long as you feel it has a pleasant character. It is the overall impression that matters. You can bitter with almost any hop as well, but clean, neutral hops are most common.

In order to cut back on the amount of hop material at the end of the boil and subsequent wort loss, I prefer to use high alpha hops. Even so, with the large hop additions of many recipes, you might want to increase your batch size to account for increased loss at the end of the boil. While all Russian imperial stouts should have a medium to aggressively high bitterness, the balance of bittering versus malt sweetness can range from sweet to boldly bitter. The bitterness to starting gravity ratio (IBU divided by OG) can range anywhere from 0.5 to 1.0 or more, but I like to target in the range of 0.6 to 0.8. Keep in mind that beers designed for long-term aging should target the higher end of the scale, as a good amount of the bitterness can drop out of the beer over time.

Even though this was at one time a British beer for a Russian court, the resurrection of its popularity in the United States means that a brewer has a number of fermentation choices. The only real must do is avoiding hot, fusel alcohols and an overly sweet finish. If you prefer a cleaner, less fruity, more American ale version, ferment with White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale). You will not have to worry too much about leaving an overly sweet beer with these yeasts either, as they tend to attenuate well even in big beers and at a range of temperatures. If you want a more complex beer, you should consider yeasts that produce more characterful esters and alcohols such as British ale yeasts. Try to stick with the British strains that still attenuate well, such as White Labs WLP007 (Dry English Ale), Wyeast 1028 (London Ale), or Danstar Nottingham if you use dry yeast.

In any case, this is a big beer so make certain you oxygenate the wort and pitch an appropriate amount of clean, healthy yeast. Most of the fermentations should be around the 65 to 70 °F (18 to 21 °C) depending on the yeast strain and recipe. Try to pick a temperature and stick with it, holding the temperature steady throughout fermentation. Holding the temperature steady is important to getting a proper level of attenuation and avoiding off-flavors, especially if you are making a bigger beer. Letting the beer go through large temperature swings can result in the yeast flocculating early or producing solventy and/or overly estery beers.

For this style, it is better to go for a big beer and anticipate aging it for a minimum of six months if not more. Time affects the balance and intensity of flavors, mellowing some of the harsher aspects and exposing some of the more delicate aromas and flavors. With enough time, it is also possible to develop vinous or Port-like qualities, which just add to the beer's complexity. Always try to stash at least a few bottles somewhere safe (where you won't drink them) for at least a year or two. With a really big beer, a decade wouldn't be too much. BYO

Saison

SAISON
by the numbers

OG:	1.048–1.065 (11.9–15.8 °P)
FG:	1.002–1.012 (0.5–3.1 °P)
SRM:	5–14
IBU:	20–35
ABV:	5–7%

Sometimes I think defining saison is a lot like defining pornography: I know it when I see it (or rather, taste it). There is such a wide variation in the farmhouse ales of Wallonia (the French-speaking part of Belgium), that I think it is foolish to state that a beer brewed by one brewery is a saison and another beer is not simply because of relatively small differences in color, strength, or bitterness. The Beer Judge Certification Program (BJCP) takes the approach of placing such beers in the Belgian specialty category. That is not an unreasonable approach, but it does seem somewhat limited.

The BJCP defines saison as, "A refreshing, medium to strong fruity/spicy ale with a distinctive yellow-orange color, highly carbonated, well hopped, and dry with a quenching acidity." Many knowledgeable people would argue with many elements of that statement, but we should not discount it completely. It does accurately describe a portion of the beers that most of us would call saison.

The best way to "define" saison might be to look at the intent of the brewers back in the day. In theory, they brewed this beer at the end of the fall for drinking over time through the warmer months. It had to be big enough to last for most of the year but not so strong that it was not quenching and refreshing in the summer. They used many local ingredients, and I have read that perhaps it was a method of storing excess grain.

Let us focus on the narrower BJCP example. This is a beer of high fruitiness (think citrus such as oranges and lemons) with little hop aroma of a spicy or floral character. Light spicy notes from yeast or spice additions are often present. The appearance ranges from golden to pale orange to amber in color. Malt character is low and leans more toward bready than toasty. The BJCP talks about tart sourness, but that is a function of storage time and bacteria levels. I would bet that the brewers of old started to consume their beer as soon as it was fermented and carbonated. If it was a good drink later as it soured, that was fine too. One thing that I think was important to the beer is adequate attenuation. If this were a beer to be consumed during the work of spring and summer, then a dry, refreshing finish would be important.

The base malt for this style is continental Pilsner malt. Pilsner malt lends a slightly sweet, grainy malt character to the beer. If you can source it, Belgian Pilsner malt is ideal. If you cannot, do not worry, even the Belgian brewers use other continental Pilsner malts. If you are an extract brewer, try to use an extract made from Pilsner malt. While it may seem like it is not worth the trouble, a beer like this does not have a lot of specialty malts to hide behind, so it is important to use a good quality Pilsner malt extract. While you could use just Pilsner malt, I think a portion of Munich, Vienna or wheat is a good addition. It adds that bready malt character without being overly sweet. If you are going to experiment, keep the bulk of the specialty malts targeted on the grainy/bready malt flavors (such as biscuit, aromatic, Vienna, or Munich) and not the sweet ones (crystal/caramel malts). However, a small amount of crystal malt can help dial in that orange-type color of the classic examples. Just be sure that you do not overdo it and end up with a too sweet caramel character. Some table sugar, especially for extract brewers, will help the beer finish dry and light. Keep the non-Pilsner malts around 10% of the total grist and the table sugar around the same.

Since this is a beer with a crisp finish, all-grain brewers should target a mash temperature around 149 °F

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Saison Ale

(5 gallons/19 L, all-grain)

OG = 1.060 (14.8 °P)
FG = 1.008 (2.0 °P)
IBU = 27 SRM = 5 ABV = 6.9%

Ingredients

9.37 lb. (4.25 kg) Best Malz continental Pilsner malt (2 °L)
0.88 lb. (400 g) cane or beet sugar (0 °L)
0.66 lb. (300 g) Best Malz Munich malt (8 °L)
0.66 lb. (300 g) Great Western wheat malt (2 °L)
0.66 lb. (300 g) Malteries Franco-Belges Caramel Munich malt (60 °L)
5.64 AAU Hallertau pellet hops (1.41 oz./40 g at 4% alpha acids) (60 min.)
3.36 AAU Hallertau pellet hops (0.84 oz./24 g at 4% alpha acids) (0 min.)
White Labs WLP565 (Saison Ale) or Wyeast 3724 (Belgian Saison) yeast

Step by Step

Belgian Pilsner malt would be the natural choice for the base malt, but you can substitute any high quality malt of a similar flavor and color from a different supplier.

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 149 °F (65 °C). Hold the mash at 149 °F (65 °C) until enzymatic conversion is complete. With the low mash temperature, you may need to lengthen the rest time to 90 minutes or more to get full conversion. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.047 (11.6 °P).

The total wort boil time is 90 minutes, which helps reduce the S-Methyl Methionine (SMM) present in the lightly kilned Pilsner malt and results in less Dimethyl Sulfide (DMS) in the finished beer. Add the bittering hops with 60 minutes left in the boil. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop addition just before turning off the burner. Chill the wort rapidly to 68 °F (20 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

You will need two packages of liquid yeast or for better results you can make a 2-L starter from one package. Pitch yeast at 68 °F (20 °C), aerate or oxygenate, and let the temperature rise slowly to 82 °F (28 °C) over the course of one week. Ferment until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but do not rush it. It is important for the beer to attenuate fully. When finished, carbonate the beer to approximately 3 volumes and serve at 45 to 50 °F (7 to 10 °C).

If you have trouble getting enough attenuation, you can hold off on adding the sugar to the boil. Instead, after the fermentation looks like it has started to slow, mix the sugar with just enough boiling water to make a syrup, then add that to the fermentation. This should encourage the yeast to consume the longer sugars before you add a substantial amount of simple sugar.

Saison Ale

(5 gallons/19 L, extract with grains)

OG = 1.060 (14.8 °P)
FG = 1.008 (2.0 °P)
IBU = 27 SRM = 5 ABV = 6.9%

Ingredients

6.6 lb. (3 kg) Pilsner liquid malt extract (LME) (2 °L)
0.88 lb. (400 g) cane or beet sugar (0 °L)
0.66 lb. (300 g) Best Malz Munich malt (8 °L)
0.66 lb. (300 g) Great Western wheat malt (2 °L)
0.66 lb. (300 g) Malteries Franco-Belges Caramel Munich malt (60 °L)
5.64 AAU Hallertau pellet hops (1.41 oz./40 g at 4% alpha acids) (60 min.)
3.36 AAU Hallertau pellet hops (0.84 oz./24 g at 4% alpha acids) (0 min.)
White Labs WLP565 (Saison Ale) or Wyeast 3724 (Belgian Saison) yeast

Step by Step

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about ¾ gallon (~3 liters) of water at roughly 155 °F (68 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.051 (12.6 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is 60 minutes after adding the bittering hops. Add the sugar and Irish moss or other kettle finings with 15 minutes left in the boil. Add the last hop addition just before turning off the burner. Chill the wort rapidly to 68 °F (20 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Follow the remaining fermentation and packaging instructions for the all-grain version.

(65 °C), regardless if this is a bigger or lighter example of the style. For extract brewers, most light colored extracts are not fermentable enough on their own, but with a portion of simple sugar (table sugar), it should attenuate enough. You will still want to buy an extract that attenuates well or you will need to make your extract-based wort more fermentable by replacing more of the extract with table or corn sugar. About 7% to 10% of the extract weight as table sugar should yield good results. There is no need to use special sugars. The cheapest grocery store brand of sugar is perfect. Beet sugar or cane sugar, it does not matter.

A big part of the dryness and bittering of a good saison comes from alcohols, carbonation, acidity and hops. I prefer to stick with noble hops such as Saaz, Hallertau or Tettnang. Styrian Goldings, Kent Goldings and in a pinch other varieties such as Mount Hood or Liberty are fine as well. I prefer a single large charge of low alpha hops near the beginning of the boil. With the light malt character, the flavor of that early addition will carry through and will provide a subtle hop character. Nowadays more brewers are experimenting with increased hop character in these beers, but it takes a deft hand to avoid overdoing it. A single, small addition near the end of the boil is about all you should add if you still want to consider the beer a "traditional" example. If you go with much more than that, you risk ending up with excessive hop character. The bitterness-to-starting gravity ratio (IBU divided by OG) ranges between 0.3 and 0.7, but I like to target approximately 0.4, because the very dry finish accentuates the bittering addition. If you are targeting a sweeter finish, then maybe you up the bittering ratio to 0.5, but rarely will you want to exceed that target.

The characteristic fruity/spicy flavors and aromas of this style come from fermentation, although some brewers do add spices. While some brewers may add spices, I prefer the more subtle and complex spiciness that fermentation develops.

There are several great yeast strains for brewing this style, but two of my favorites are White Labs WLP565 (Saison Ale) or Wyeast 3724 (Belgian Saison). Other excellent choices are WLP566 (Belgian Saison II), WLP568 (Belgian Saison Blend), Wyeast 3711 (French Saison) and Wyeast 3726 (Farmhouse Ale). You cannot go wrong with any of these yeast strains. Whatever strain you use, remember that your fermentation conditions affect what flavors and aromas the yeast produce. Pitching rate, oxygen level, nutrients, and temperature are like dials on your control panel of fermentation flavor. Getting the right settings is your job as a brewer.

One question that many brewers have about these beers is fermentation temperature. Often homebrewers will say, "Brewery X ferments their beer at xx °F, so that is the fermentation temperature I use." That most likely will not be the right temperature for you if you are trying to make a beer like theirs. There are many other factors that go into brewing than temperatures. For example, fermenter height plays a role in flavor development, with very tall fermenters (like big commercial cylindroconical types) suppressing ester and fusel alcohol production. The shape of the brewery's fermenters, their pitching rates, their oxygen levels, their yeast collection and repitching methods may all be different than yours, changing the production of esters, fusel alcohols and other aspects of fermentation. Figure out what works in your own homebrewery and work within those parameters.

With most of these yeasts I recommend pitching at a rate of 0.75 million cells per milliliter per degree Plato (see the pitching rate calculator at www.mrmalty.com for help in calculating this for your beer). Pitch the yeast and allow 12 to 36 hours for the majority of yeast growth, then ramp up the temperature for the rest of fermentation to ensure good attenuation. For example, pitch the yeast at 68 °F (20 °C) and at the end of the next day slowly begin raising the temperature each day. Try to end up at 82 °F (28 °C) by the end of one week. You may find a higher or lower temperature or a faster or slower rise in temperature gives you the ideal result, so do not be afraid to tweak the parameters until you get it right.

One concern when brewing this style is getting enough attenuation. Many brewers go with lower and lower mash temperatures in an attempt to achieve this, but that is not always the problem. It is not that you need to get rid of all of the long chain dextrins to make a dry beer. Those dextrins are not very sweet and they can be present in a nice, dry beer. The important thing is to make sure you ferment out all of the simpler sugars completely. If you leave a lot of unfermented maltose, then the beer is going to taste sweet, even though it might attenuate well. A healthy pitch of yeast, aerating or oxygenating, and controlling fermentation temperatures are the keys to getting a dry finish.

If you are having trouble getting a dry beer, one trick that seems to help is waiting near the end of fermentation before adding the simple sugars. Wait until fermentation has started to slow and then add the sugar. When I do this, I dissolve the sugar in just enough boiling water to make a thick syrup and add it to the beer when it has cooled.

If all else fails and you still are not getting full attenuation, you can pitch actively fermenting lager yeast into the stuck beer, which will consume some complex sugars that the ale yeast will not. Do not add this extra dose of yeast if they are not in an active fermentation state, because they will just settle out in a high alcohol, low sugar environment. Make a small starter and wait until the yeast is at high kräusen before you add it to the beer.

If your beer is attenuating properly but still tastes sweeter than it should, it might be fermentation related compounds making it seem sweet. If that is the case, then you need to revisit your fermentation parameters and /or try a different yeast strain. BYO

Schwarzbier

While in Trier, Germany's oldest city, I experienced what my wife would call a "beer moment." I sat at an outdoor café table with my family and drank a Köstritzer Schwarzbier, a fine example of a unique beer style brewed in Germany since the late Middle Ages. As I enjoyed my beer, I wondered about the people of Trier during that time and if they enjoyed this black beer as much as I did.

The first documented mention of Schwarzbier is from 1390, only a short time after the Black Death ravaged Europe. How does a society go through something like that without changing? And what about the Köstritzer Schwarzbierbrauerei, brewing this beer since 1543? Who were their customers? We know historic figures such as Goethe and Bismarck were fans, but what about the average person? Those beer lovers kept a brewery and a style like this going for 700 years despite feast or famine, war or peace.

Schwarzbier's aroma can be the same as a pale lager, but the appearance can be almost black. It is one of the darkest of the lagers, ranging from dark brown to almost black – not like a stout, but as close to black as you can get. If you hold a glass of Schwarzbier up to strong light it should be brilliantly clear with ruby highlights.

While dark in color, Schwarzbier ranges from almost no roast character to subtle notes of bitter chocolate and coffee. Despite the use of some highly kilned malt, this is a beer without the astringent notes of stouts. Köstritzer Schwarzbier-brauerei describes their Schwarzbier as, "the black one with the blond soul." If you close your eyes, the aroma and flavor of Köstritzer is very much like a German pilsner. The flavor carries only subtle roast notes, which helps dry the finish.

Another classic example is Kulmbacher's Mönchshof Schwarz. It is a sweeter beer and more on the brown end of the color scale. It has a huge Munich malt character, very much like a Munich Dunkel, yet it also has a touch of chocolate and a drier finish than a dunkel. In the United States, it is common to brew Schwarzbier a little darker, slightly sweeter, and a little bit roastier than both Köstritzer and Mönchshof Schwarz.

Regardless of the level of roasted notes, this is a smooth, easy-drinking, balanced style of beer, with some finishing a bit on the sweet side and others a bit on the dry. All Schwarzbiers have far less roast flavors than stouts or porters. These slight roast notes are like dark bitter chocolate, almost coffee-like, but never highly burnt or acrid. The roast also helps dry the finish. The aromas always have some nice bready malt notes and sometimes hints of caramel and noble hops. These are also clean lagers, with no fruit esters or diacetyl.

Hop bittering is moderate and balanced in a way that does not overwhelm the slight residual malt sweetness of the beer. German Munich and Pilsner malts form the bulk of the grist. A mix of about 50% of each contributes the right balance of Munich malty and Pilsner grainy, the base flavors of this style. For a single infusion mash, you might skew the balance a little more toward Munich malt. If you prefer decoction mashing, shift the balance more in favor of Pilsner malt, perhaps as much as 15% either way. If you want to make a beer more like Köstritzer, the grist should be 90% continental Pilsner malt and 10% or less Munich malt. I recommend that extract brewers make every effort to obtain a continental Pilsner extract.

Specialty malts determine much of the character of this beer. Done right, the roasted notes are restrained even though the color is quite dark. The key to getting that rich hue with-

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SCHWARZBIER
by the numbers

OG:	1.046–1.052 (11.4–12.9 °P)
FG:	1.010–1.016 (2.6–4 °P)
SRM:	17–30+
IBU:	22–32
ABV:	4.4–5.4%

Schwarzbier, American Style

(5 gallons/19 L, all-grain)

OG = 1.051 (12.6 °P)
FG = 1.013 (3.3 °P)
IBU = 30 SRM = 28 ABV = 5%

Ingredients

5.5 lb. (2.5 kg) Munich malt (8 °L)
4.0 lb. (1.8 kg) Pilsner malt (2 °L)
5.0 oz. (142 g) crystal malt (40 °L)
5.0 oz. (142 g) chocolate malt (400 °L)
3.0 oz (85 g) roasted barley (500 °L)
3.0 oz (85 g) Weyermann Carafa® Special II (430 °L)
5.4 AAU Hallertauer hops (1.36 oz./39 g of 4% alpha acids) (60 min.)
2 AAU Hallertauer hops (0.50 oz./14 g of 4% alpha acids) (20 min.)
0.50 oz. (14 g) Hallertauer hops (0 min.)
White Labs WLP830 (German Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

This recipe makes a slightly bolder Schwarzbier, malty like Mönchshof, but a touch roastier. E.J. Phair Brewing Company in Concord and Pittsburg, California won gold at the 2005 Great American Beer Festival with a beer based on this recipe.

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) for 60 minutes to allow for proper grain hydration and enzymatic conversion. Infuse the mash with near boiling water while stirring or, with a recirculating mash system, raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.1 gallons (23.1 L) and the gravity is 1.042 .

The total wort boil time is 90 minutes, which helps reduce the SMM (S-methyl-methionine) present in the lightly kilned Pilsner malt and results in less DMS (dimethyl sulfides) in the finished beer. Add the bittering hops with 60 minutes remaining and the flavor hops with 20 minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil and add the last hop addition just before shutting off the burner. Chill the wort rapidly to 50 °F (10 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Ferment around 50 °F (10 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in two weeks or less, but don't rush it. Cold fermented lagers take longer to ferment than ales or lagers fermented at warmer temperatures. If desired, perform a diacetyl rest during the last ⅓ of fermentation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2 to 2.5 volumes. A month or more of cold conditioning at near freezing temperatures will mellow some of the flavors and improve the beer. Serve at 43 to 46 °F (6 to 8°C).

Schwarzbier, American Style

(5 gallons/19 L, extract with grains)

OG = 1.051 (12.6 °P)
FG = 1.013 (3.3 °P)
IBU = 30 SRM = 28 ABV = 5%

Ingredients

3.5 lb. (1.6 kg) Munich liquid malt extract
3.0 lb. (1.4 kg) Pilsner liquid malt extract
5.0 oz. (142 g) crystal malt (40 °L)
5.0 oz. (142 g) chocolate malt (400 °L)
3.0 oz. (85 g) roasted barley (500 °L)
3.0 oz. (85 g) Weyermann Carafa® Special II malt (430 °L)
5.4 AAU Hallertauer hops (1.36 oz./39 g of 4% alpha acids) (60 min.)
2 AAU Hallertauer hops (0.50 oz./14 g of 4% alpha acids) (20 min.)
0.50 oz. (14 g) Hallertauer hops (0 min.)
White Labs WLP830 (German Lager) or Wyeast 2206 (Bavarian Lager) yeast

Step by Step

Mill or coarsely crack the specialty malts. Mix well and place loosely in a grain bag. Avoid packing the grains too tightly in the bag; use more bags if needed. Steep the bag in 2 gallons (~8 L) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 6.1 gallons (23.1 L) and a gravity of 1.042 (10.48 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. Total wort boil time is one hour after adding the bittering hops. During that time, add the flavor hops with 20 minutes remaining, Irish moss or other kettle finings at 15 minutes, and the aroma hops at shut-down. Chill the wort to 50 °F (10 °C), pitch the yeast and aerate thoroughly. Follow the fermentation and packaging instructions for the all-grain version.

out an acrid, stout-like flavor is using non-bitter dark roasted malt. Although there are a few de-bittered black malts out there, my preference is Weyermann Carafa® Special, a huskless roasted malt. The lack of a husk means far less bitter roasted flavors. Carafa® Special comes in several color levels: Carafa® Special I (340 °L), II (430 °L), and III (530 °L). I prefer the flavor of Carafa® Special II for this style, though the other colors will work fine in a pinch. Weyermann also makes Carafa®, which has a husk and a lot more roasted character, so make sure you're getting the huskless variety. Weyermann also makes Sinamar®, a liquid extract of Carafa® Special, made in accordance with the Reinheitsgebot. It is quite easy to use and provides as good a result as using the grain itself. Just add it to the boil kettle to adjust the color. One ounce (28 g) of Sinamar® in 5 gallons (19 L) of liquid adds 6 SRM of color and little in the way of roasted flavor. The only problem with Sinamar® is that it is a bit harder to find than Carafa® Special.

If you want to make a drier, crisper Schwarzbier similar to Köstritzer, all you need is Pilsner, Munich and Carafa® Special. To brew this style a touch roastier and sweeter, as is common in the United States, a portion of non-fermentable malt is needed. Adding sweetness changes the character of the roasted malts and allows for a slightly higher roast character with less apparent roast bitterness, much like adding sugar to black coffee. Caramel malt around 40 °Lovibond does the trick and CaraMunich® II (45 °L) is a good choice. It adds a bit of caramel flavor and just enough sweetness to fill out the beer. Three to four percent in a five-gallon (19-L) batch is about right. Don't go too heavy on the crystal malt. Using more than 5% in five gallons is too much. You can use other caramel malts instead, such as US or English-made crystal malts with good results. For the additional roasted notes, a small portion of chocolate malt (no more than 3 to 4%) and roasted barley (no more than 2%) will add that character. That is the limit. Going past that point really puts the beer out of style. The mash temperature for this style ranges from 150 to 154 °F (66 to 68 °C) depending on how crisp you want the finished beer. When making a version similar to Köstritzer, target a lower mash temperature. If making a bigger, bolder version, go with a higher mash temperature to leave the beer with a bit more body.

> "Schwarzbier's aroma can be the same as a pale lager, but the appearance can be almost black. It is one of the darkest of the lagers, ranging from dark brown to almost black — not like a stout, but as close to black as you can get. If you hold a glass of Schwarzbier up to strong light it should be brilliantly clear with ruby highlights."

Schwarzbier is not a hoppy style, yet it often has a touch of hop flavor and aroma. Use only German noble hops, such as Hallertauer or Tettnanger, for the late additions. In a five-gallon (19-L) batch, a half-ounce (14 g) addition at 20 minutes and another at flameout is enough.

A small amount of flavor and aroma from the bittering addition tends to carry through to the finish, so I prefer to bitter with German hops as well. If you wish to use a higher alpha acid hop to reduce the amount of hop matter and cost, Magnum is a good choice.

Schwarzbier can be fermented with any number of German lager yeasts. My preference is Wyeast 2206 (Bavarian Lager) or White Labs WLP830 (German Lager) yeast because of their clean, traditional German lager flavor. Good alternatives to experiment with are Wyeast 2308 (Munich), Wyeast 2124 (Bohemian), White Labs WLP838 (South German), White Labs WLP833 (German Bock) and White Labs WLP820 (Oktoberfest/Märzen) yeast. You will need around 360 billion clean, healthy cells to properly ferment 5 gallons (19 L) of this beer, which is double what you would use for an equivalent strength ale. One package of liquid yeast in a 2.2-gallon (8.3-L) starter, or 2 packages in a 3.5-quart (3.3-L) starter, will result in the right amount of yeast. If you're not making a starter, you'll need about four packages of liquid yeast. If you're using dry yeast, use approximately 0.7 ounce (20 g) of properly rehydrated yeast.

When making lagers, I like to get the wort down to 44 °F (7 °C), oxygenate and then pitch the yeast. I let the beer slowly warm over the first 36 hours to 50 °F (10 °C) for the remainder of fermentation. This results in a clean lager, with very little diacetyl. This is similar in theory to a Narziss fermentation, where the first two-thirds of the fermentation is done cold and the final third is done warmer. In any case, don't rush things. Good lagers take time and ferment slower than ales, especially when fermented cold. Once the beer has finished fermenting, a period of lagering for a month or more at near freezing can improve the beer. BYO

Scottish Ales

SCOTTISH ALES
by the numbers

OG:	1.038–1.040 (8.8–10 °P)
FG:	1.010–1.015 (2.6–3.8 °P)
SRM:	9–17
IBU:	10–25
ABV:	3.2–3.9%

The first Scottish ale I ever brewed was a sixty-shilling ale that turned out thin and watery, so I set the keg aside and forgot about it. About a year later I came across the keg and tried what I thought was going to be a stale, thin beer. Instead it had been magically transformed. The head was now fine, thick, and long lasting and the beer seemed to have a lot more body. I entered it in competitions and, sure enough, it placed high every time. This success triggered my interest in Scottish ale and taught me that even small beers can benefit from some period of cold conditioning.

This is a style that can be brewed at a variety of strengths. The Beer Judge Certification Program (BJCP) style guide includes 60/-, 70/-, and 80/- Scottish ales. Many years ago the price of a cask of Scottish ale including the tax was given in shillings. This was written as the number of shillings, a slash, and then the number of pence (shillings/pence). When there are no pence, they would write a dash instead (shillings/-). When you see 70/-, read it as "seventy shilling." Today the shilling number is still a relative indication of one beer's strength to another, and in Scotland, when ordering Scottish ale, you ask for a "seventy" or an "eighty." Unfortunately, 60/- is virtually nonexistent at pubs in Scotland today. In the U.S., the trend is also toward the higher alcohol versions such as 80/- and more (Odell Brewing Company of Fort Collins, Colorado makes an award-winning 90/-).

Most Scottish ales range in color from very light amber to a deep copper color. They are very clean beers with few apparent esters, except when made as big beers. They have a malt-focused aroma, with bread and toasted malt notes, caramel, and some residual malt sweetness. Most classic examples have just enough hop bitterness to keep the beer from being too sweet. Generally, any hop flavor and aroma is found in trace amounts from the early bittering addition. The body is thinner on the smaller beers and full on the big beers, but they should never be thin and watery or super thick and heavy.

Some beer judges will detect slight peat smoke notes in this style, even when there is no peat malt used. Perhaps it is the combination of roasted malt and malt sweetness or perhaps it is something else in combination with minor oxidation that is perceived as a very slight smoky, earthy, or peat-like note. Contrary to popular belief, there should never be peat smoked malt in Scottish ale. Much confusion was caused a number of years ago when some written descriptions mentioned peat or smoked character in these beers. Brewers took this description to heart and started adding peat smoked malt to Scottish beers and judges started hunting for any suggestion of it. I've heard some people say it is the water or the yeast that provides this peat character, but the water and clean ale yeast I use don't produce peat or smoke character in any of my other beers. Yet many beer judges do comment on peat smoke character in my Scottish ales. I'm not saying that they don't actually have that perception, but I think for many judges, they probably try a little too hard to find peat character in Scottish ales and it is actually more imagination than reality. While the judging of this style continues to improve, every now and then I still hear of judges asking brewers to add peat smoked malt to their beers, which is wrong. Do not add peat malt to any of the beers in this category. If you do, it isn't really a Scottish ale, it's a smoked beer.

The basis for today's Scottish ales is well-modified British pale ale malt. British pale ale malt is kilned slightly darker (2.5 to 3.5 °L) than the average American two-row or pale malt

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Scottish Heavy 70/-

(5 gallons/19 L, all-grain)

OG = 1.038 (9.5 °P)
FG = 1.014 (3.5 °P)
IBU = 15 SRM = 15 ABV = 3.2%

This recipe makes a great Scottish 70/- and you can adjust it to make 60/-, 70/- or 80/- beers. When increasing or decreasing the starting gravity of a recipe, the specialty grains remain the same; it is only the base malt and hop bittering that changes.

Ingredients

5.5 lb. (2.5 kg) British pale ale malt (3 °L)
1.0 lb. (0.45 kg) crystal malt (40 °L)
0.5 lb. (227 g) honey malt (18 °L)
0.5 lb. (227 g) Munich malt (8 °L)
0.25 lb. (113 g) crystal malt (120 °L)
3.0 oz. (85 g) pale chocolate malt (200 °L)
3.15 AAU East Kent Goldings hops (0.63 oz./18 g of 5% alpha acid) (60 mins)
White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts (1.4 L) of water to 1 pound (0.45 kg) of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 158 °F (70 °C). Hold the mash at 158 °F (70 °C) for 60 minutes to allow for proper grain hydration and enzymatic conversion. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.029 (7.4 °P). The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort to 65 °F (18 °C) and aerate thoroughly. The proper pitch rate is one package of liquid yeast in a 1-liter starter.

Ferment at 65 °F (18 °C) until the yeast drops clear. Fermentation will be slow and steady at this temperature and with healthy yeast, fermentation should be complete in about one week. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Serve at 48 to 52 °F (9 to 11 °C). Allowing the beer to cold condition at 40 °F (4 °C) or lower for several months will improve the beer.

60/- and 80/- options:

To make a 60/- ale, decrease the British pale ale malt to 4.75 lb (2.15 kg) and reduce the hop addition to 0.56 oz (16 g). The post-boil gravity should be 1.034 (8.6 °P).

To make an 80/- ale, increase the British pale ale malt to 8.5 lb (3.85 kg) and increase the hop addition to 0.85 oz (24 g). The post boil gravity should be 1.053 (13 °P). Use two liquid yeast packages or make a 1.5-liter starter using one yeast package.

Scottish Heavy 70/-

(5 gallons/19 L, extract with grains)

OG = 1.038 (9.5 °P)
FG = 1.014 (3.5 °P)
IBU = 15 SRM = 15 ABV = 3.2%

Ingredients

3.6 lb. (1.63 kg) English pale ale liquid malt extract (3.5 °L)
1.0 lb. (0.45 kg) crystal malt (40 °L)
0.5 lb. (227 g) honey malt (18 °L)
0.5 lb. (227 g) Munich malt (8 °L)
0.25 lb. (113 g) crystal malt (120 °L)
3.0 oz. (85 g) pale chocolate (200 °L)
3.15 AAU East Kent Goldings hops (0.63 oz./18 g of 5% alpha acid) (60 mins.)
White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale) yeast

Step by Step

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in about two gallons (~8 L) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22 L) and a gravity of 1.032 (8.2 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. During that time add the Irish moss or other kettle finings at 15 minutes before shutdown. Chill the wort to 65 °F (18 °C) and aerate thoroughly. The proper pitch rate is one package of liquid yeast in a 1-liter starter. Follow the fermentation and packaging instructions for the all-grain version.

60/- and 80/- options:

To make a 60/- ale, decrease the English pale ale extract to 3.1 lb (1.4 kg) and reduce the hop addition to 0.56 oz (16 g). The post boil gravity should be 1.034 (8.6 °P).

To make an 80/- ale, increase the English pale ale extract to 5.6 lb (2.5 kg) and increase the hop addition to 0.85 oz (24 g). The post boil gravity should be 1.053 (13.1 °P). Use two liquid yeast packages or make a 1.5-liter starter using one yeast package.

(1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors. A few malt companies (Crisp Malting is one) still produce British pale ale malt from cultivars such as Maris Otter and Golden Promise using a traditional floor malting method. The result is malt with a slightly darker color (3.5 to 4.0 °L) and more flavor than other pale ale malts. It provides a biscuit and bread-like maltiness that is fundamental to these styles. While you can use North American two-row malt in a pinch (~1.5 °L), the more highly-kilned North American pale ale malt (~2.5 °L) is a better choice.

Highly-modified British malts are perfectly suited to single infusion mashes, which is typical for all Scottish beers. Mash around 158 °F (70 °C) for Scottish ales, to produce highly dextrinous wort. Highly dextrinous wort (created through proper mash temperature and a substantial amount of specialty grains) is needed in this style, as it creates a beer with more non-fermentable, complex sugars. It is these polysaccharides, which provide enough body to keep the beer from being thin and watery.

If you're brewing with extract, your best choice is an extract made from British pale ale malt. There are some British style malt extracts currently on the market made from 100% Maris Otter malt and they are an excellent choice for Scottish beers. If you must use North American two-row malt or extract made from it, you'll need to compensate with some additional specialty malts such as biscuit or Victory®, but remember to use restraint.

There are two schools of thought when brewing Scottish ale. One camp brews this style using pale ale malt, a touch of black malt or roasted barley for color, heavy kettle caramelization to develop caramel flavors, and an extended boil to develop additional melanoidins. The other camp, based on an idea I first learned from Ray Daniels, uses specialty malts, such as crystal, honey and Munich to provide the characteristic malty, caramel flavors of Scottish ale instead of a caramelizing step and an extended boil.

In my experience, beers made with heavy kettle caramelization often have a strong toffee note, which many people describe as buttery and a flaw in the beer. While it may not be very traditional, I prefer the specialty grain method.

When using the specialty grain method you're trying to create three characteristics in the beer: a rich, malty flavor of bread and toast, a caramel sweetness, and a slight background roast grain note. For highlighting the malt character, I like Munich and honey malt for approximately 10% of the grist. A bold dose of mid-color crystal malt (~40 °L), as much as 15%, creates an easily recognizable caramel sweetness. A touch of dark crystal malt (~120 °L) adds some interesting background burnt caramel and raisin notes. Many other recipes out there use a dash of highly-kilned grain in the 500 °L or darker color range. I find that a bit much and prefer to use lighter kilned malt, specifically pale chocolate (200 °L). Along with a slight roast note, the pale chocolate lends a deep, dark, toasted bread note to the beer.

> "If you have particularly hard water, you might cut it with distilled water or boil your water to precipitate some of the calcium carbonate."

Good hop choices for Scottish ales are East Kent Goldings or Fuggles. The hop bitterness in this style is quite subdued — just enough to keep the beer from being overly sweet. Hop flavor and aroma should be from very low to none at all. A single addition early in the boil is all that is needed. Target a bitterness to starting gravity (IBU divided by OG) ratio around 0.3 to 0.5.

Scottish ale is traditionally brewed with fairly soft water, which keeps the hop bitterness from being sharp and enhances the soft maltiness of the beer. If you have particularly hard water, you might cut it with distilled water or boil your water to precipitate some of the calcium carbonate. I have moderately hard water, but I only adjust my water for proper mash pH when brewing Scottish ales. If your water tastes good, it will usually make a fine Scottish ale.

Yeast selection for Scottish ales is quite straightforward: pick a clean-fermenting ale yeast with moderate attenuation. Many brewers find White Labs WLP028 (Edinburgh Ale) and Wyeast 1728 (Scottish Ale) yeast satisfactory. However, I prefer White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale). These are both very clean fermenting yeasts, lacking most of the diacetyl and ester production of other yeasts, and with a combination of cool, controlled fermentation, a relatively high mash temperature, and plenty of specialty malts the attenuation is moderate. If you're making a big beer and want it to have a bit more esters, the Edinburgh/Scottish yeast is a good choice. Ferment around 60 to 62 °F (16 to 17 °C) with the Edinburgh or Scottish yeast or 65 °F (18 °C) with the California Ale or American Ale yeast. Cold conditioning the beer for a month or two at near freezing temperatures helps it mature.

Scottish ales require a relatively low level of carbonation. Add just enough to impart a bit of mouthfeel and to drive the aroma out of the glass and up to your nose. Too much carbonation makes the smaller beers seem dry, harsh, and acidic, while gentle carbonation can make them feel creamy and soft. Aim for 1.5 to 2.0 volumes of CO_2 for bottled product. This is about two-thirds of the carbonation of a typical American pale ale, so you'd use two-thirds the amount of priming sugar at bottling time. If you keg or cask condition your beer, aim for 1.0 to 1.5 volumes. BYO

Witbier

Having just arrived in Paris, I was exhausted. I was looking forward to a bed with a cool, fluffy, white pillow, but our room wasn't ready. We wandered down to the local café to have a bite to eat and I found a fluffy pillow of another sort to ease my exhausted state, Blanche de Bruges. On draft, this beer has a huge, white head, which persists until the last drop. Ah, it was beer magic for a weary traveler.

In the 17th and 18th Centuries, witbier (bière blanche in French) was the dominant beer style in Brussels. The breweries in Leuven and Hoegaarden, 15 to 30 miles (24 to 48 km) east of Brussels, supplied witbier to Brussels and other European cities. Of course, as it has been with many unique European beer styles, the damage done during two World Wars and competition from modern lager brewers have had a great impact on smaller breweries. Eventually witbier popularity waned and after World War II the style became virtually extinct. Luckily, Pierre Celis revived the style with Oud Hoegaards Bier, later known and popularized as Hoegaarden in the United States.

The Blanche de Bruges I enjoyed in Paris is a fine example of the Witbier style, with a very light sweetness balanced by a citrusy orange fruitiness and a fairly crisp, refreshing finish. The best examples of the style always seem to have a soft, creamy feel without being cloying or heavy. Witbeer has gentle perfumey, spicy, herbal, citrusy notes with none boldly standing out. The flavors and aromas come together to form a light and refreshing beer with a slightly dry and fruity finish. These are moderate alcohol beers in the 4.5 to 5.5% ABV range. Held to the light, they are quite cloudy from starch haze, with a very light straw to light golden color in the background.

The grain bill for a witbier is not as flexible as many other beer styles. It requires unmalted wheat and continental Pilsner malt as the base. If you can't get those ingredients, you can try malted wheat and North American two-row malt, but the flavor, aroma, mouthfeel and appearance just won't have that soft, slightly sweet and gently grainy character. Additional grains often include oats and a melanoidin rich malt like Munich. I think the addition of 5 to 10% oats is critical for brewing a great witbier. They not only give a slight background complexity to the malt character, they also add quite a bit to mouthfeel. Some describe the character of oats in beer as having a "silky" feel and I agree. The unmalted wheat and oats also add to the cloudy white color of the beer and the persistent head. Munich malt is a common ingredient in many witbier recipes. This is one of the ingredients that could be left out, but I like the way it adds a slight bready note that is warmer in character than the base malts. Added with restraint, Munich, aromatic or melanoidin malt gives a nice little complexity to the beer.
Keep the amount to 5% or less. If you over do it, the flavor becomes too strong and works against the soft grainy background.

It is tricky to make a great extract witbier. This is a beer that benefits from all-grain or partial mash brewing to convert the unmalted wheat and oats. If using extract and steeping grains only, you'll need to increase the amount of base malt, as neither the oats nor the unmalted wheat will add any fermentable sugars from steeping alone. To create a starch haze, you can add a tablespoon of wheat flour to the boil.

Witbier can be brewed with a wide variety of hops, but I prefer German noble hops for their gentle, clean, bittering character. While the Beer Judge Certification Program (BJCP) style guide hints at low-hop flavor and aroma being acceptable,

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WITBIER
by the numbers

OG:	1.045–1.053 (11.0–12.9 °P)
FG:	1.008–1.012 (2.1–3.1 °P)
SRM:	2–4
IBU:	10–20
ABV:	4.5–5.5%

Blanche Oreiller

(5 gallons/19 L, all-grain)

OG = 1.050 (12.4 °P)
FG = 1.011 (2.8 °P)
IBU = 20 SRM: 4 ABV = 5.0%

Ingredients

4.5 lb. (2.0 kg) flaked wheat (1 °L)
4.9 lb. (2.2 kg) Pilsner malt (1.6 °L)
1.1 lb. (0.5 kg) flaked oats (1 °L)
0.25 lb. (113 g) Munich malt (8 °L)
0.5 lb. (227 g) rice hulls
4 AAU Hallertau hops
(1.0 oz/28 g of 4% alpha acids)
(60 mins.)
1.5 oz. (43 g) fresh citrus zest
(5 mins.)
0.4 oz. (11 g) crushed coriander
seed (5 mins.)
0.03 oz. (1 g) dried chamomile
flowers (5 mins.)
Wyeast 3944 (Belgian Witbier),
White Labs WLP400 (Belgian Wit
Ale) or Brewferm Blanche dried
yeast

Step by Step

Mill the grains (including the flaked grains, but excluding the rice hulls). Mix the rice hulls into the grain post milling and dough-in targeting a mash of around 1.5 quarts of water to one pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 122 °F (50 °C). Hold the mash at 122 °F (50 °C) for 15 minutes then raise the temperature over the next 15 minutes to 154 °F (68 °C). Hold until conversion is complete, about 60 to 90 minutes. Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.039 (9.7 °P). The total wort boil time is 90 minutes. Add the hops and spices according to the ingredients list. Chill the wort rapidly to 68 °F (20 °C), let the break material settle, rack to the fermenter and aerate thoroughly. Pitch ten grams of properly rehydrated dry yeast or use two liquid yeast packages. Alternatively make a 2 qt. (2 L) starter using one package of liquid yeast. Begin fermentation at 68 °F (20 °C) slowly raising temperature to 72 °F (22 °C) by the last one-third of fermentation. When finished, carbonate the beer to approximately 2.5 to 3 volumes of CO_2.

Blanche Oreiller

(5 gallons/19 L, partial mash)

OG = 1.050 (12.4 °P)
FG = 1.011 (2.8 °P)
IBU = 20 SRM = 5 ABV = 5.0%

Ingredients

5.5 lb. (2.5 kg) wheat liquid malt
extract (4 °L)
0.25 lb. (113 g) Munich liquid malt
extract (9 °L)
1.0 lb. (0.45 kg) Pilsner malt (1.6 °L)
1.13 lb. (0.51 kg) flaked oats (1 °L)
4 AAU Hallertau hops
(1.0 oz/28 g of 4% alpha acids)
(60 mins.)
1.5 oz. (43 g) fresh citrus zest
(5 min.)
0.4 oz. (11 g) crushed coriander
seed (5 min.)
0.03 oz. (1 g) dry chamomile
flowers (5 min.)
Wyeast 3944 (Belgian Witbier),
White Labs WLP400 (Belgian Wit
Ale) or Brewferm Blanche dried
yeast

Step by Step

Mill the grains (including the oats) and place loosely in a grain bag (or bags). Avoid packing them too tightly in the bag. Steep the bag in 2 gallons (~8 L) at a temperature of 154 °F (68 °C) for about 60 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bag. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22 L) and a gravity of 1.043 (10.6 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. Follow the remaining instructions for the all-grain version.

Blanche Oreiller

(5 gallons/19 L, extract with grains)

OG = 1.050 (12.4 °P)
FG = 1.011 (2.8 °P)
IBU = 20 SRM = 5 ABV = 5.0%

Ingredients

6.6 lb. (3 kg) wheat liquid malt
extract (4 °L)
0.25 lb. (113 g) Munich liquid malt
extract (9 °L)
1.1 lb. (0.5 kg) flaked oats (1 °L)
4 AAU Hallertau hops
(1.0 oz/28 g of 4% alpha acids)
(60 mins.)
1.5 oz. (43 g) fresh citrus zest
(5 mins.)
0.4 oz. (11 g) crushed coriander
seed (5 mins.)
0.03 oz (1 g) dry chamomile flowers
(5 mins.)
Wyeast 3944 (Belgian Witbier),
White Labs WLP400 (Belgian Wit
Ale) or Brewferm Blanche dried
yeast

Step by Step

Place the oats loosely in a grain bag. Since the oats will swell, avoid packing them too tightly in the bag. Use more bags if needed. Steep the bag in 2 gallons (~8 L) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Since this is only oats, squeeze the bags to extract the liquid. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22 L) and a gravity of 1.043 (10.6 °P). Stir thoroughly to help dissolve the extract and bring to a boil. Follow the remaining instructions for the all-grain and partial mash versions.

you're better off with neither. Hop flavor and aroma in this beer seems to battle with the other subtle spice notes. You absolutely don't want to go with any bold American-type hops. I know it sounds like a good idea to use citrusy American-type hops in a beer that needs some citrus character, but it doesn't work in a witbier. There are too many other flavors in the hops that don't go well with this style. The spices, yeast character and carbonation also add dry, slightly bitter notes and accentuate the hop bitterness. Thus, in order to balance this style, you often need less hop bitterness than you might need in a non-spiced beer.

A common mistake many brewers make when first attempting this style is going overboard on the addition of spices. While the herbal, citrus and spicy notes are obviously present, the best witbiers use those flavors and aromas as subtle highlights to the malt and fermentation character. The flavors and aromas from spices should blend harmoniously with the fermentation-derived esters and phenolics, not overpower them. However, this is often tricky to accomplish, as many spices vary in strength based on the source of the spice. How you add the spices to the beer also makes a big difference.

There are two basic times to add spices to a beer: during the boil or post fermentation. The easiest is to toss them into the boil during the last few minutes, letting heat and the water extract the spice character. This is a good method for many spices because there is no danger of contamination and extraction happens quickly. The drawback is that you don't know how much spice character you're getting until you taste the beer after fermentation. Another issue is that the character of many spices change once heated and can seem "cooked" after a short time in the boil. Even with those potential drawbacks, adding spices late in the boil, as the Belgians do, is a good method for witbier. The alternative is adding spices directly to the beer. Adding spices after the bulk of fermentation is done allows better precision, as you can taste the beer every few days to see how the flavor and aroma develop. With this method there is some danger of contamination, especially in beers with moderate alcohol levels like witbier. You can also dose the beer with spices boiled gently in a little water.

The best technique for adding spices to witbier is a combination of methods. Add them late in the boil, but use restraint. Start out with an amount you know will not be overwhelming. If it turns out the spicing wasn't enough, you can always bump it up by boiling some spices in a little water and adding them in, or adding dry spices post fermentation.

> "The best way to add citrus character is with fresh citrus. The petrified bits of orange peel often used may be authentic, but fresh zest has a much brighter character."

The best way to add citrus character is with fresh citrus. The petrified bits of orange peel often used may be authentic, but fresh zest has a much brighter character. Select tangerines or oranges (that aren't green) with a nice bold, fresh aroma. If you have a citrus tree, let the fruit ripen longer, building a rich fruit character. Use a citrus zester to peel the very surface of the skin and avoid digging deep into the white pith as it is bitter and lacks citrus character. Measure the zest by weight, targeting about one to two ounces (28 to 57 g) in a 5-gallon (19-L) batch.

Coriander is probably the trickiest of the witbier spices to balance properly. Not only does the spice intensity vary considerably among suppliers and sources, but how you add it makes a big difference, too. I gently crush the coriander with the back of a heavy spoon to expose the inside of the seeds, which gives it a fairly strong, spicy character versus whole seeds. The level of coriander is probably the area most brewers overshoot, resulting in a really peppery beer. The desired result is a gentle, background spicing, not an overwhelming one. If you have fairly fresh coriander, start with 0.4 oz (11 g) per 5-gallon (19-L) batch added during the last five minutes of the boil.

Randy Mosher, in his book *Radical Brewing*, discusses the use of chamomile as an important part of a witbier recipe. It does not hurt to add the chamomile, and it is quite easy. If you have fresh chamomile, use about 0.25 oz. (7 g); otherwise, use chamomile teabags. Many chamomile teas have additional herbs and spices so only use types with just chamomile flowers. You'll need about three tea bags for a 5-gallon (19-L) batch, although I've used as many as ten bags without it becoming overwhelming. Cut open the bags and toss the flowers into the boil for the last five minutes.

As in most beer styles, the yeast makes a big difference in the character of the beer. I have a very strong preference for Wyeast 3944 (Belgian Witbier) or White Labs WLP400 (Belgian Wit Ale). If you use dried yeast, I've heard that Brewferm Blanche will do a respectable job. Pitch the yeast at 68 °F (20 °C) and hold the temperature steady for the first two-thirds of fermentation. This moderate temperature keeps the esters and phenols from getting out of hand. As the fermentation slows, slowly raise the temperature to 72 °F (22 °C) over the last couple days, which increases the activity of any still-active yeast cells and helps ensure complete attenuation. When you're finished, carbonate to approximately 2.5 to 3 volumes of CO_2. BYO

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by Beer Judge Certification Program (BJCP) classification

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