



GERMAN PILSNER



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German Pilsner

by Jamil Zainasheff

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 bitterness versus malt sweetness should always be to the bitter side. You want a firm bittering presence, one that is obvious,

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%



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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 lbs. (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 aer-

ate 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 lbs. (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 impor-



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

tant to this style.

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 pack-

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

ages 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.

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. 

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