

Homebrewing Lager

Cold Is Cool Again

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A Little Bit about Me

Wordy Things

- Editor-in-Chief of [Zymurgy](#)
- Author of [Lager: The Definitive Guide to Tasting and Brewing the World's Most Popular Beer Styles](#) (Voyageur Press, 2017)
- Author of [The Illustrated Guide to Homebrewing](#) (Unfiltered Media, 2016)

Nerdy Things

- Certified BJCP judge
- Certified Cicerone
- Homebrewer since 2009
- Desert island lagers:
 - Augustiner-Bräu Lagerbier Hell
 - Aecht Schlenkerla Eiche
 - Schönramer Pils
 - Pilsner Urquell Tankovna

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What Is Lager?

Lager is a family of beer styles historically characterized by

- Cold fermentation at 45–55°F (7–13°C)
- Yeast species *Saccharomyces pastorianus*, a hybrid of *S. cerevisiae* and *S. eubayanus*
- Extended aging (“lagering”) near 32°F (0°C)
- Clean expressions of malt and hops with less yeast character than typical for top-fermenting strains



What Isn't Lager (Necessarily)?

- Thin and yellow
- Synonymous with Pilsner
- Less flavorful than ale
- Easier to brew than ale
- Less alcoholic than ale



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Well-Known Lager Styles

Pale and amber lagers

- North American & international “green bottle” pale lagers
- Munich Helles
- German Pils & Bohemian Pilsner (Světlý ležák)
- Oktoberfestbier
- Märzen & Vienna lager
- Heller Bock/Maibock
- California common

Dark lagers

- Munich Dunkel
- Czech dark lager (Tmavý ležák)
- Schwarzbier
- Dunkler Bock
- Doppelbock & Eisbock
- Most Rauchbier
- Baltic porter



Ingredient Selection

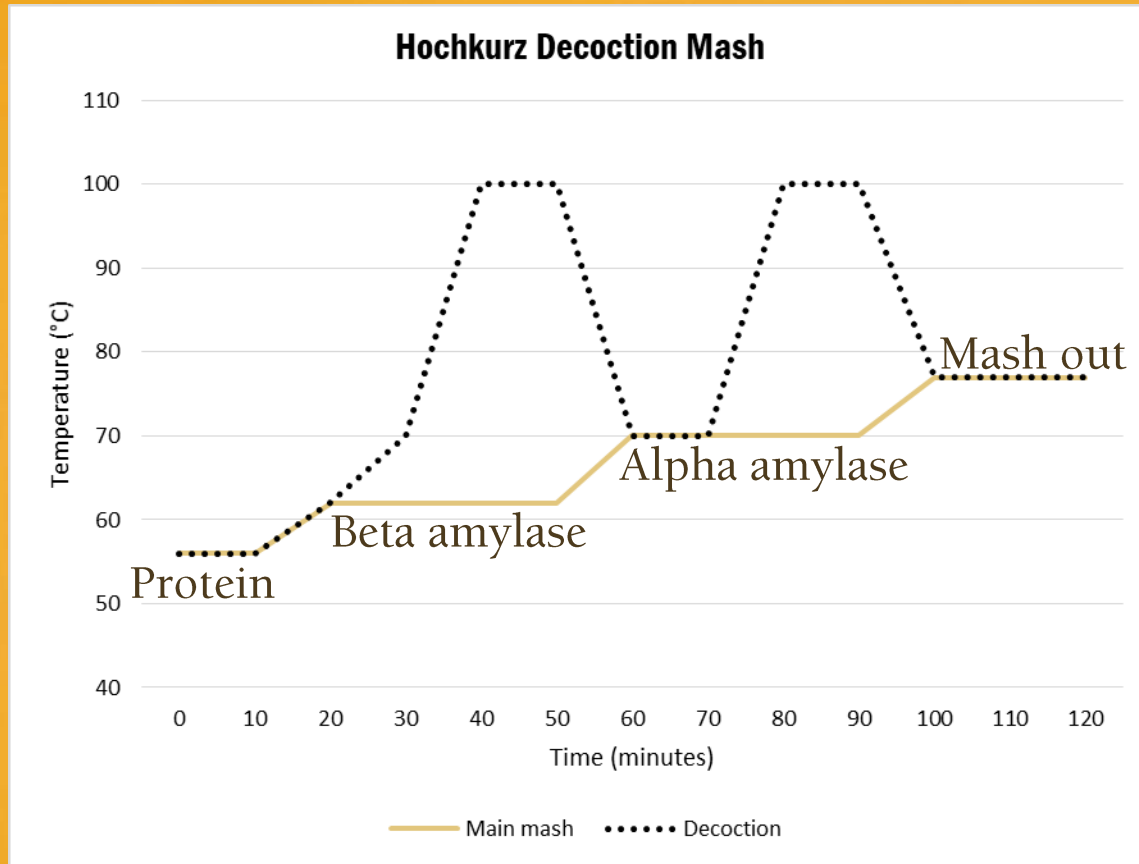


- Malt
 - Hops
 - Water
- Up to you! Use traditional ingredients for traditional styles, but don't be afraid to experiment for a modern take.
- Yeast: Lots of options!
 - Weihenstephan 34/70, Augustiner, Andechs
 - Urquell, Budějovice
 - Swiss lager
 - California lager
 - American lager

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Lager Wort Production



- Single-temperature infusion mash
 - Suitable for virtually all modern malts
 - Easily executed
- Step mash
 - Unnecessary for conversion
 - Separate beta and alpha amylase rests promote attenuation and dryness
 - Keep protein rest short if used at all
- Heating options
 - Hot water infusion
 - Direct heat
 - Decoction



Decoction Effects



Rothaus Pils



Pilsner Urquell

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Yeast Suggestions

- Lager strains are many, but they typically have more in common with each other than do ale strains
- Pick one yeast strain and get to know it
- Pitch lots of yeast
- Pitch cold and allow to slightly warm, not the other way around
- Don't fear the rotten eggs



Liquid Yeast Pitches

- Calculate liquid yeast pitch as *number of cells*
- Pitch rate for lagers: 1.5M–2M cells/mL/°P
 - 350B–475B cells for 5 gal. (18.9 L) of 1.050 (12.5°P) wort
 - 425B–550B cells for 5 gal. (18.9 L) of 1.060 (15°P) wort
- Liquid yeast packs typically offer 100B–200B cells
 - Use several fresh yeast packs ...
 - Or make a big starter
(I like the yeast calculator at Brewer's Friend)



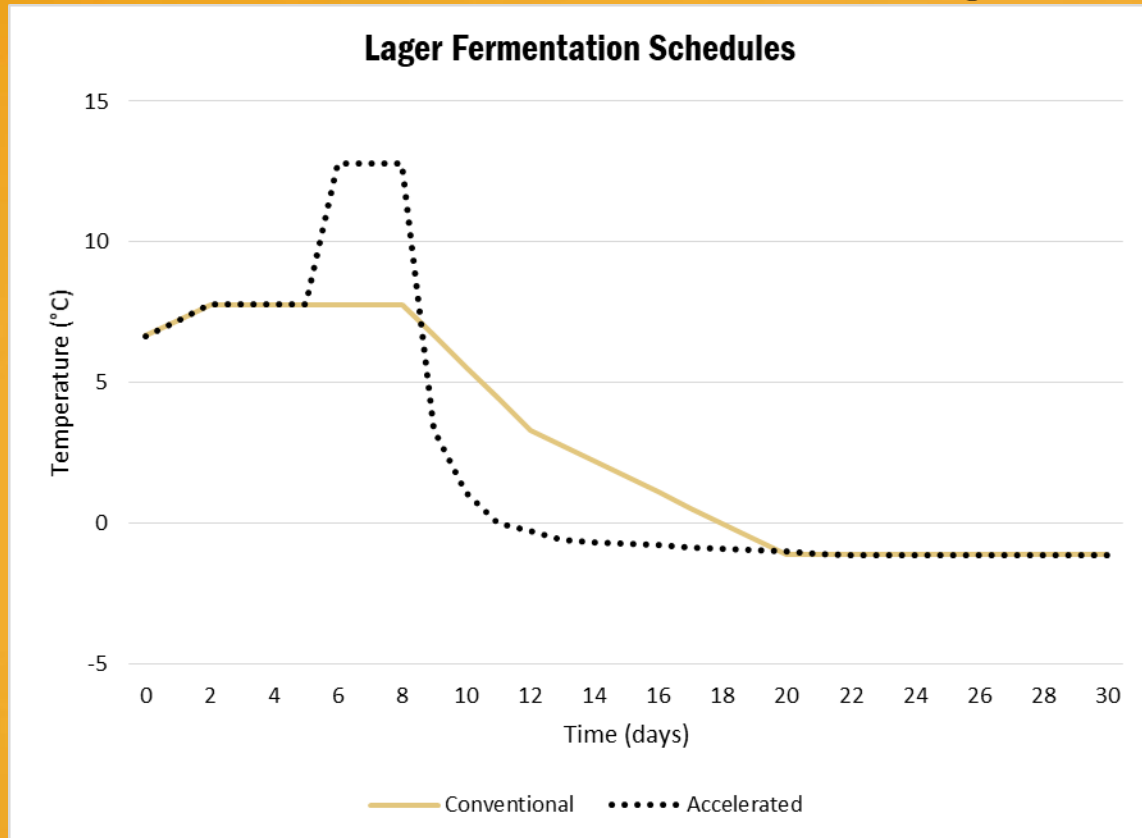
Dry Yeast Pitches

- Calculate dry yeast pitch *by weight*
- Dry yeast typically offers 5B–20B cells per gram, depending on whom you ask
- Assuming 8–10B cells per gram balances cost and craziness and implies 90B–115B cells in a 11.5 g sachet
- Still need 3 sachets for 5 gal. (18.9 L) 1.050 (12.5°P) wort
- Lallemant's yeast [pitch calculator](#) is a good resource
- Trust your own results

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Lager Fermentation



- Traditional fermentation
 - Constant temperature ferment
 - Slow chill to lager temperature
- Modern accelerated fermentation
 - Initial cold ferment
 - Higher temperature later (diacetyl rest)
 - Faster drop to lager temperature
- Pressurized fermentation
 - Ferment @ 62–68°F (17–20°C) w/ 1 bar (15 psi)
 - Lager 3–5 days near freezing w/ 1 bar (15 psi)
 - WLP925 High Pressure Lager Yeast



Warm Lager Fermentation

- Some homebrewers have done this.
- I have not done this.
- That doesn't mean it doesn't work.
- It only means I haven't done it.
- Trust your own results.
- [“The Most Neutral Lager Strain? Effect of Pitching Rate and Fermentation Temperature on Strain Weihenstephan 34/70”](#)
by José Pizarro (Homebrew Con 2019)



Lagering Phase

- Historically, lagering is a long period of cold conditioning at or near the freezing point of water
- I have found fermentation more critical to a clean lager
- I've "lagered" at room temperature with acceptable (though not necessarily award-winning) results
- If you only have one temperature-controlled environment, control fermentation



Off-ish Flavors

Dimethyl sulfide (DMS)



Hydrogen sulfide



Sulfur dioxide



Diacetyl

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Advanced Topics: Spunding

Blichmann

- Natural carbonation using primary yeast
- Seal a *pressure-capable* vessel when fermentation is nearly complete
- Use a pressure relief valve!!
- Expect about 1 volume (2 g/L) of CO₂ for every 0.5°P (2 gravity points) of fermentable sugar
- Need to know approx. FG in advance



BrewHardware.com

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Advanced Topics: Kräusening

- Add a measure of actively fermenting beer to finished beer and seal the keg or bottle
- Reinheitsgebot-compliant carbonation
- Math can be tricky: see “Kräusening” by Chris Colby, [Zymurgy, Nov/Dec 2018](#) for details



Dave's Top 5 Lager Tips

1. Use traditional ingredients (and the methods those imply) for traditional styles.
2. Pitch more yeast than you think you need.
3. Ferment cold, and pitch even colder.
4. Don't stress the lagering phase if you don't have the means.
5. Trust your own experience: what works professionally may not work for homebrewers (and vice versa).

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Recommended Reading

Handbook of Brewing by Hans Michael Eßlinger

Yeast by Chris White & Jamil Zainasheff

Dark Lagers by Thomas Kraus-Weyermann & Horst Dornbusch

A Brief History of Lager by Mark Dredge

New Brewing Lager Beer by Greg Noonan

Lager by Dave Carpenter

Historic German and Austrian Beers for the Home Brewer

by Andreas Krennmair

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