Non- and low-alcohol brewing for homebrewers

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What are we talking about?

Definitions vary by country, but roughly:

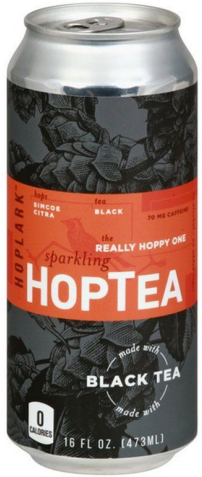
My focus

Alcohol-free: <0.05%

Non-alcoholic: <0.5%

Low-alcohol: 0.5 to <3%

Others



Why bother?

1. **Most people**: health/lifestyle
2. **Homebrewers**: it's challenging
3. **Breweries**: growing market, way to grow revenue in January

🇺🇸 NA sales grew 20% in 2021 (packaged fell) from 0.6% baseline

🇩🇪 15% of Germans consumed NA beer in 2021, 7% market share with preference for radlers, wheat beer

🇦🇺 45% in 2022 reported drinking NoLo, 32% regularly (7% teetotal)

🇪🇸 48% of drinkers drank NA, 15.6% of beer sales by volume in 2021

🌎 58% drinking more non-alcoholic and low-ABV cocktails than year ago

Challenges

Achieving balance is hard; factors to consider:

- Sweetness from residual sugars
- Body and viscosity in mouthfeel
- Alcohol’s drying effect, sweetness
- Bitterness
- Acidity
- Carbonation and its impact on body
- Other flavors that can balance or boost character like roast, smoke

“The first thing that one needs to come to terms with on this quixotic quest to make an alcohol-free Negroni is that one is not making a Negroni.”

Sometimes it’s just better to lean in to the limitations

Methods for NoLo brewing

Recommended

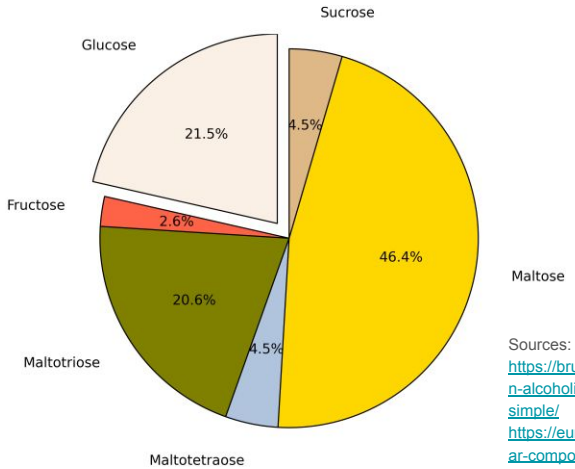
1. **Mash super high to convert to complex sugars that yeasts can't break down**
2. Use a maltose-negative yeast: most control, but requires impeccable sanitation (Weihenstephaner?)
3. Cold mashing (the "Briess" method)
4. Standard brewing with very small grain bill

Technically an option

5. Prematurely arrested fermentation
6. No fermentation
7. Use alcohol-free malt extract (unclear if this is more than a gimmick)

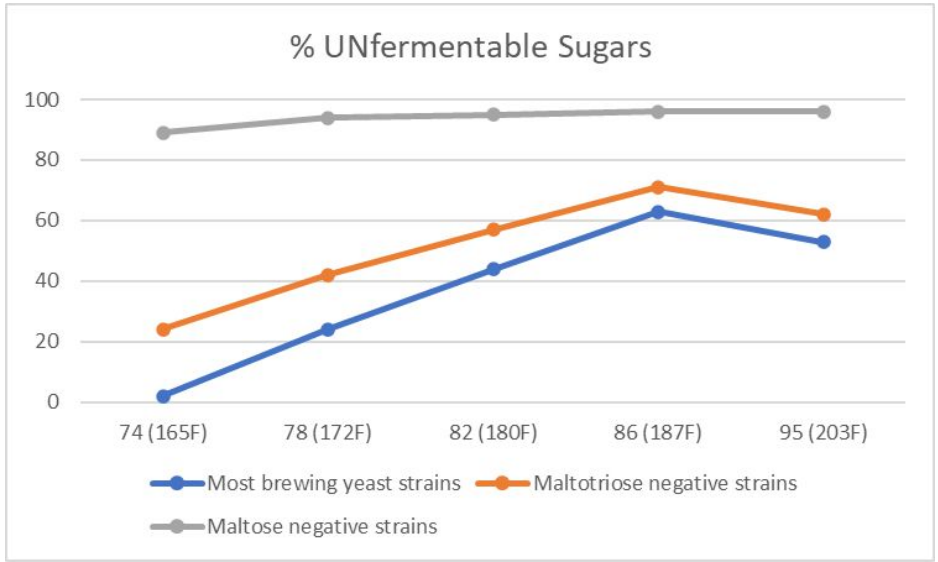
High-tech, capital intensive

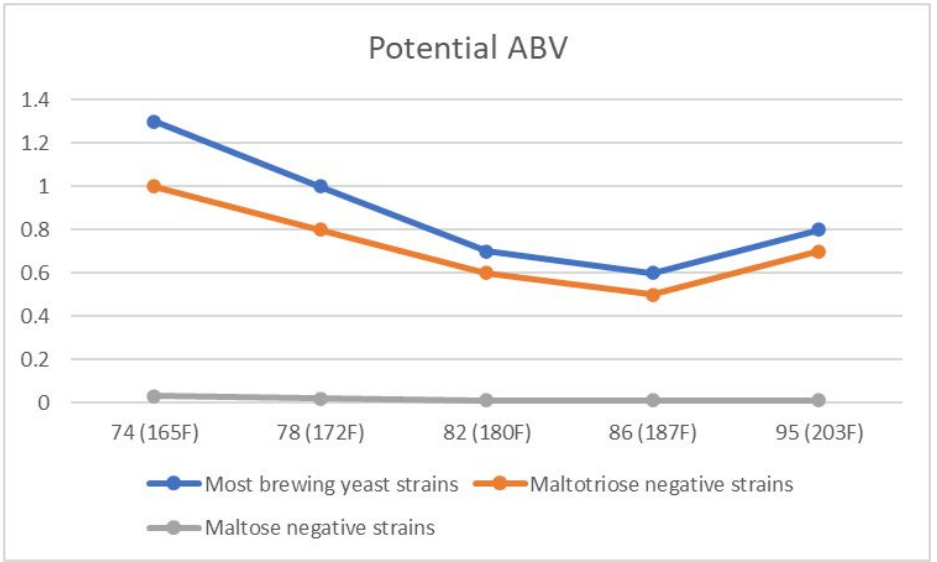
7. Membrane filtering
8. Reverse osmosis
9. Vacuum distilling
10. Centrifugal separation
11. Thermal separation/boil off



Sources:
https://brulosophy.com/2021/11/11/the-brewing-of-non-alcoholic-and-ultralow-alcohol-beer-methods-made-simple/
https://eurekabrewing.wordpress.com/2015/01/13/sugar-composition-of-wort/

My preferred method: super high-temperature mashing





Source: https://www.lallemandbrewing.com/wp-content/uploads/2021/06/LAL-bestpractices-Low_alcohol_beer-DIGITAL.pdf

Method

Recipe planning

- Take off about 5-10 percentage points from your efficiency
- Total grain bill of 12 oz per gallon (90g/L) ~1.018 OG
- Assume about 20% yeast attenuation, ~1.016 FG
- Use characterful base malts e.g. Munich
- Can increase the percentage of crystal malts, but not strictly necessary (don’t overdo it either)
- Use specialty malts to add character depending on style (e.g. smoked, roasted)

Mashing and fermenting

- Mash at 174-180F (79-82C) for 15-30 minutes
- Use CaCl in water to add body and fullness
- Boil as normal, aim for 20 IBUs (careful not to go too high), add yeast nutrient
- Use maltodextrin to adjust OG upward if necessary
- Adjust acidity to <4.4 pH
- Opt for low-attenuating yeasts where possible, ferment as normal, usually takes only a few days

Three recipes (1 gallon)

Light **(Lager, v7)**	**Dark** **(Stout, v5)**	**Grodziskie** **(Polish smoked wheat, v2)**
260g/79% Vienna 60g/18% Biscuit 10g/3% Rye malt 4g Crystal at 30 mins 10g Hallertau Mittelfruh + whirlfloc + yeast nutrient at 10 mins 6g H. Mittelfruh at whirlpool Ferment with Cal Lager ¼ tsp CaCl in water, adjusted with acid blend to 4.3 pH OG 1.016, FG 1.014, 0.2% ABV	150g/29% Munich 120g/24% flaked barley 60g/12% maltodextrin 90g/18% 60L Crystal 45g/9% Carafa II 45g/9% roasted barley 7g Centennial at 30 mins 4g Northern Brewer at 0 mins Ferment with Windsor ¼ tsp CaCl in water, adjusted with acid blend to 4.3 pH OG 1.024, FG 1.017, 0.9% ABV	110g/31% light munich 110g/31% rauch malt 110g/31% flaked wheat 40g/7% maltodextrin 9g H. Mittelfruh at 30 mins 2g H. Mittelfruh at 2 mins Ferment with Cal Lager ¼ tsp CaCl in water, adjusted with acid blend to 4.3 pH OG 1.018, FG 1.015, 0.5% ABV

Tips, reminders, accumulated wisdom

SAFETY FIRST

- Minimize botulism risk: acidity needs to be <4.5 pH to inhibit botulism spores (or alcohol concentration above 2.5%)
  - Chill your beer quickly, oxygenate well
- If brewing NA commercially, pasteurization or preservatives are non-negotiable: no room for error on ABV, infections, etc.
  - Athletic: “Probably the single most important takeaway of this is that NA beer is not possible without tunnel pasteurization to be safe.”

Tips

- Water heavily influences perception
- Monitor mash pH closely because low gravity wort has lower buffering capacity
- Use maltodextrin or lactose to raise finishing gravity
- Add yeast nutrient, it's going to struggle
- Very very easy to over-hop, so use extracts and cryo products to calibrate
- Try using chilies to emulate ethanol burn?
- Blend at bottling with regular strength beer for complexity