

Fast Kettle Souring

(using Lactobacillus)

What is Kettle Souring?

Creating acidified beer prior to primary fermentation in a short period of time using lactobacillus.

We do this by: Creating an optimal environment for lactobacillus to create lactic acid. Also, while creating an environment that is suboptimal for other bacteria. Lactobacillus converts lactose and other sugars into lactic acid.

Pros:

- Fastest way to naturally create sour beer
- No extended aging
- Control over sourness
- Adding hops post souring
- Can be fermented with any yeast as primary
- No "sour only" equipment

Cons:

- Still a risk of messing it up
- pH < 3.3 can interfere with Sacc fermentation
- Not as complex as long aging

Types of Lactobacillus:

Homofermentative: makes only lactic acid

Heterofermentative: makes lactic acid, alcohol, CO₂

Taxonomy: L. delbrueckii, L. brevis, L. plantarum, etc

Sources: Commercial cultures, Grains, Yogurt, Sourdough, Probiotic Drinks, and Probiotic Pills

Types of Unwanted Bacteria:

Clostridium: Butyric acid (vomit)

Active: <~100°F, pH > ~4.7, and anaerobic

Indole Producing Bacteria: indole (feces)

Active: pH > ~4.4

Acetobacter: acetic acid (vinegar)

Active: <~86°F, pH > ~4.5, and aerobic (oxygen)

Mold: (earthy and musty)

Active: aerobic (oxygen)

Bad infection if black or bright in color

Beers to Kettle Sour:

Kettle souring different ratios of the grist is possible if only a slight reduction in pH is desired.

- Berliner Weisse / Gose (Low 3's pH)
- Saison / Farmhouse (Low to Mid 3's pH)
- Sour Pale Ales (Low 3's pH)
- Summer Beers (Low to High 3's pH)
- Anything else you want to add a slight "kick" to...

By Alan Schafers

Creating a Kettle Soured Beer:

1. Using your normal method (mashing, extract, extract w/ grains) obtain your initial wort.
2. Boil for 15m and DO NOT add hops
3. Lower pH <4.5 using 88% lactic acid (1 TBSP per 5 gallon wort) or equivalent acid
4. Cool to ~120°F
5. Pitch Lactobacillus starter
6. Cover with Plastic wrap and purge with CO₂
7. Keep at manufacturer's recommended temperature or 104°F to 116°F (Check MTF)
8. Take pH reading every 12-24 hours (try to limit oxygen exposure)
9. Should take 24 to 72 hours to sour. Once desired pH is obtained, boil wort and add hops as you normally would ("kills" off the lacto).
10. pH will also drop from yeast fermentation and dry hopping may increase pH slightly.

Creating a Lactobacillus Starter:

- Timing:
 - Commercial strains - 24 to 36 Hours before sour mash
 - Wild Strains - 72+ hours before sour mash.
- Create a starter. (1L per 5 gal.)
- Combine the following ingredients per 1 Liter of wort and boil for 15 minutes:
 - 90 grams Dry Malt Extract
 - 20 grams Dextrose (Glucose) (Corn sugar)
 - 1 gram Yeast Nutrient or DAP (diammonium phosphate)
 - Add an Acid/Buffer to the starter:
 - Commercial strains - 20 grams Calcium Carbonate (CaCO₃ / chalk) or,
 - Wild strains - 1/4 tsp 88% lactic acid per 1lb
- Cool below 120°F, add 1 cup base malt per 1L.
- Flush w/ CO₂, cap with airlock. (or top off w/ carbonated water)
- Keep at proper temperature
 - Commercial strains - See lab's recommended temperature
 - Wild strains - Keep between 104°F-116°F
 - Cultured Sources - Check MTF Wiki depending on the source
- Smell the starter before brewing. It should have a good sour smell and nothing gross or rancid.
- Strain, add to cooled mash/wort.

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Aroma of Lactobacillus beers:

- Good Aromas
 - Musty or Flowery (“good funk”)
 - Sugary, Syrupy, & Sweet
 - A little Buttery (Certain strains of Lactobacillus can produce diacetyl in their fermentation)
- Bad Aromas (aka something went wrong)
 - Parmesan Cheese, Rancid Milk, or Stinky Feet (Isovaleric Acid)
 - Vomit or Bile (Butyric Acid)
 - Fecal, Manure, Poopy Diaper (Aromatic Indoles)
 - A strong presence of Vinegar (Acetic Acid)
 - Band Aid, Liquid Smoke, Medicinal (Phenolic Compounds)

Recommended Equipment:

pH Meters: Hach Pocket Pro+ (~\$120), Milwaukee MW102 (~\$110), and Thermoworks 8689 (~\$69)

Maintaining Heat: Burner, FermWrap, Brew Belt, Aquarium heater, Sous Vide, Heat Lamp, and Space Heater

Key takeaways:

- Keep initial pH below 4.5.
- Keep Oxygen away!
- Pitch enough lacto cells
- Keep temperature at recommended levels or 104°F to 116°F.
- Use a pH meter
- pH scale is logarithmic
- Beer/Wort is safe to drink when pH is below 4.5 and alcohol is present
- Be prepared and don't be afraid

References:

Dr Lambic: <http://sourbeerblog.com/category/brewing-topics/fermentation/fast-souring-brewing-topics/>

Derek Springer: NHC 2015 Berliner and Beyond or <https://www.fivebladesbrewing.com>

The Sour Hour Podcast:

<http://www.thebrewingnetwork.com>

Michael Tonsmeire: American Sour Beer Book or <http://www.themadfermentationist.com/>

Milk the Funk: Facebook group or <http://www.milkthefunk.com/>

Recipes:

Berliner Weisse [23A]

50% Pilsner / 50% Wheat or 100% Wheat Extract

Target OG: 1.032

Mash: 148F for 60m

Boil: ~5 IBU (Noble Hop) for 60m

Clean Ale Yeast or 100% Brettanomyces

3.2 – 3.5 pH

Note: A Gose can be made by adding .25 oz of sea salt and .5 oz of Ground Coriander Seed per 5 gal.

SIPA (Sour Indian Pale Ale) [28B]

65% 2-Row / 25% Wheat / 10% Flake Rye

Target OG: 1.033

Mash: 152F for 60m

Boil: ~30 IBU Citra / Centennial added at 190F and whirlpool for 30m+ then finish chilling. Add equal amounts as a dry hop

Clean Ale Yeast or 100% Brettanomyces

3.2 – 3.5 pH

Samples:

Basic Semi-Wild Berliner [5/29/2016]

100% Wheat LME with 5 IBU Golding @ 60

OG: 1.033, FG: 1.010, ABV: 3% Final pH: 3.38

Lacto from Grains. S-05 for Primary

SIPA “Clean” and “Dirty” [6/10/2016]

Recipe from above with Azacca instead of Centennial Soured 9 gal 4.46 pH wort for 36 hours using the Yeast Bay: “Beta” Lacto Blend. Diluted to 13 gal post souring with pH of 3.33. Boiled and hopped and split between two fermenters. OG: 1.029

“Clean” Mid-West Ale for Primary

FG: 1.007 / Final pH: 3.32 / ABV: 2.9%

“Dirty” Amalgamation (100% Brett Blend) for Primary

FG: 1.010 / Final pH: 3.35 / ABV: 2.5%

Document available online:

<https://drive.google.com/open?id=0Bz86spaEuPGcZ1Rsb1NZC1saEU>

