



SOUR WORTING

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Definition

- Creating sour wort by inoculating wort with souring bacteria, prior to standard beer production (boiling & fermentation).
- More commonly known as Kettle Souring.
- Can be done in the mash-tun (Sour Mash), boil kettle or other vessel.
- Generally uses one or more strains of *Lactobacillus*
- Safer to use in non-sour brewery as bacteria is killed before production of the beer – minimizing, but not eliminating, chance of brewery-wide contamination



Types of beers you can make

- Berliner Weisse
 - Gose
 - Fruited Sours
 - Hybrids
 - Use as a blending option
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- NOT Belgian styles - since only lactic acid is created, the sourness is not nearly as complex as true spontaneously fermented or other wild ales that use a combination of lacto/pedio/brett/wood/time



A little about Lacto

- Anaerobic rod-like bacteria
- Multiple strains available to brewers – *L. delbruckii*, *L. brevis*, *L. plantarum*, are most common but more arriving on the scene
- Strains are either Heterofermentative or Homofermentative
 - Homofermentative – produces just lactic acid when fermenting
 - Heterofermentative - produce lactic acid, CO₂ and other compounds when fermenting
- Each strain has its optimal temperature range – usually between 90-120°F – though some can perform well at temps outside this range
- Cannot fully ferment wort
- Will degrade proteins, thus affecting head retention



A little about Lacto

- Sources of Lacto include popular yeast labs, yogurt (unpasteurized non-fat Greek), probiotics and grains
- Not hop tolerant. When using lacto in fermentation, be sure to keep hop additions very low if you use them at all
- Always make a starter with cultures because quicker acidification is better. Generally a 1L starter for 5 gals.
- Souring can take from 18-72 hrs depending on pitch rate and temperature.
- Most of the pH drop occurs in the first 18-24hrs.
- Typically look for a final pH of 3.0-3.4. Brewers should check pH of comparative beers to shoot for their final pH.



What could possibly go wrong?

- Off flavors from other bacteria – enteric, butyric, isovaleric
- “Dirty” lacto flavors
- Poor or incomplete fermentation due to low pH
- pH may exceed or fall short of expectation
- Cross contamination

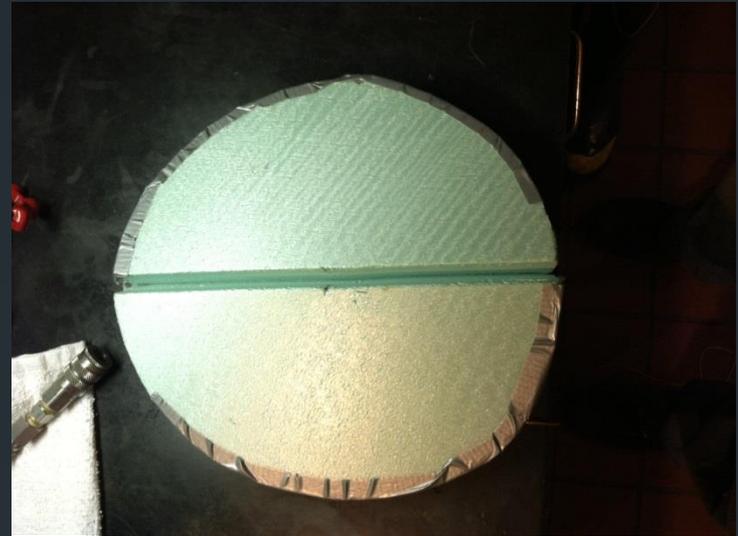


What You Will Need

- Standard brewing equipment used to produce, boil and cool wort
- Beer ingredients
- Heat source with temperature control
- Source of Lactobacillus
- pH meter
- A way to close the vessel and apply heat
- Patience

Essential Procedure

- Create wort via normal procedure
- Lower pH as much as possible
 - (4.8 to 4.5 optimal)
- Heat wort to 180°F – Boil
- Cool wort to ~100°F and hold
- Inoculate with Lactobacillus
- Purge headspace with CO₂
- Seal vessel to maintain CO₂ environment
- Wait for pH to drop to desired level
- Boil wort as usual, or heat to 180°F minimum to kill bacteria
- Cool and ferment with plenty of yeast (or brettanomyces)



How we created Pucker Up Porter

1. Decided on a kettle sour, but wanted to do something different
2. Since roasty flavors don't pair well with sour, we chose a brown porter with most color coming from late use of Black malt
3. 5g batch created over 2 separate days. Adjusted based on that
4. Weds night – created 10g starter using DME & Omega OYL-605 lacto blend. Kept in keggles with heating blanket attached
5. Friday night – created sour porter wort. Added acid malt and black malt for sparge only after sacc rest
6. Brought to a short boil then cooled via heat exchanger
7. Pitched lacto starter, purged with CO₂ and inserted stack cover. Set kettle temp to maintain 100°F
8. Added lactic acid after 12hrs
9. Sunday morning – completed boiling, cooled and pitched healthy dose of Kölsch yeast



Homebrewing Considerations

- Pretty easy to accomplish using existing equipment
- Quality pH meter is a must!
- Kettle lids work perfect to seal out air. I used Press'n Seal wrap as well after CO₂ purge
- Hardest part is keeping temperature consistent. Ferm wraps don't go high enough. Consider using *L. plantarum* to help if heat will be an issue.
- Temperature controller is also important to keep *Lactobacillus* growing at proper temperatures.



Conclusions

- Fairly easy to perform if you invest in a few tools
- While it make sour beer, it's still not “traditionally” soured, so don't expect to make great Gueuze, Lambic or Flanders styles.
- Experiment
 - Blend
 - Make small (1g) batches
 - Vary your ingredients
 - Vary the L. strain or sources
- Keep your sanitation top notch!



Resources

- Milk the Funk Wiki - <http://www.milkthefunk.com>
- Milk the Funk Facebook Group
- Sour Hour podcasts - <http://www.thebrewingnetwork.com/category/shows/sourhour/>
- American Sour Beers by Michael Tonsmeire
- Mad Fermentationist blog - <http://www.themadfermentationist.com/>



Lactobacillus Suppliers

- Wyeast – <http://wyeastlab.com>
- White Labs – <http://www.whitelabs.com>
- Omega Yeast – <http://omegayeast.com/>
- The Yeast Bay – <http://www.theyeastbay.com>
- East Coast Yeast