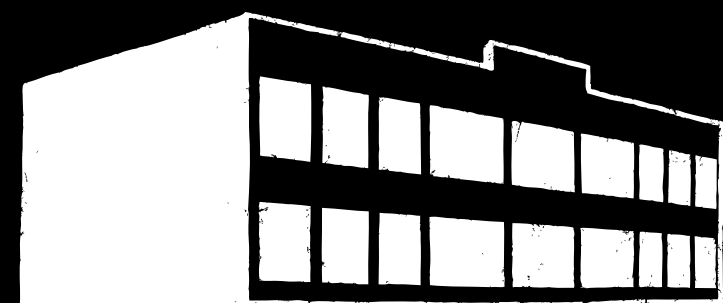


Shortcut to Sour

Kettle Sour Tips



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BREWERY + PUBLIC HOUSE



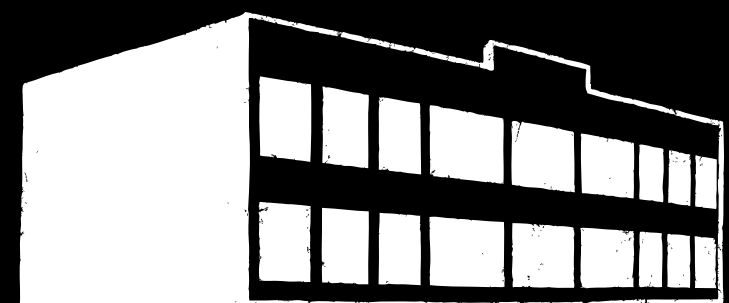
Luke Barrett

Sultan of Sensory



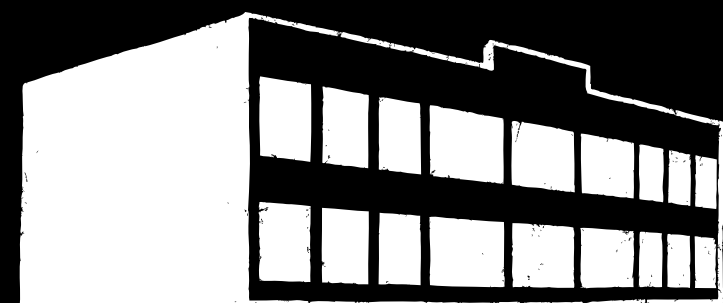
David Coyne

Barrel Baron



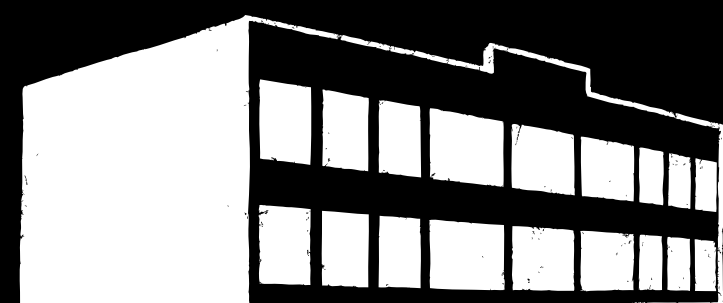
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What is a Kettle Sour?



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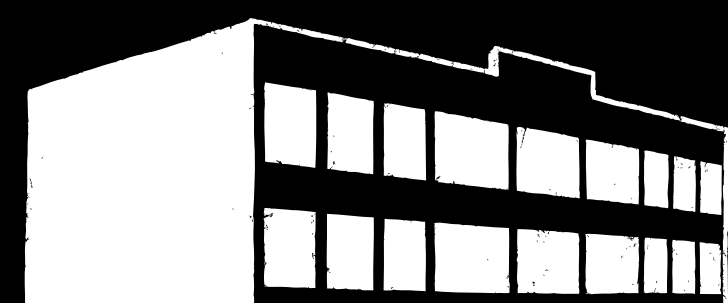
	Method	Pros and Cons	Styles of Beer made this way	Microbes Used
Kettle Sour (Soured Wort & Quick Souring)	Soured wort over a couple days in the Kettle, Mash Tun, or a Fermenter	No bacteria in the fermenters or Packaging Equipment	Berliner Weisse, Gose, and just straight kettle sours	Saccharomyces and Lactobacillus
Pitched Mixed Cultures	Soured after the boil in a stainless Fermenter or Oak Fermenters	Lab grown bacteria and “wild” yeast in fermenters and packaging	Berliner Weisse, Gose, Flemish Red and Oud Bruin, and American Sours	Saccharomyces, Brettanomyces, Lactobacillus, Pediococcus, and Acetobacter
Spontaneous Sour Beer	Bacteria and Yeast captured naturally in the air, most commonly through a coolship (koelschip)	Who knows what in your fermenters and packaging	Lambic, Gueuze, and Kriek (Oude-100% spontaneous) some American Producers	Lots



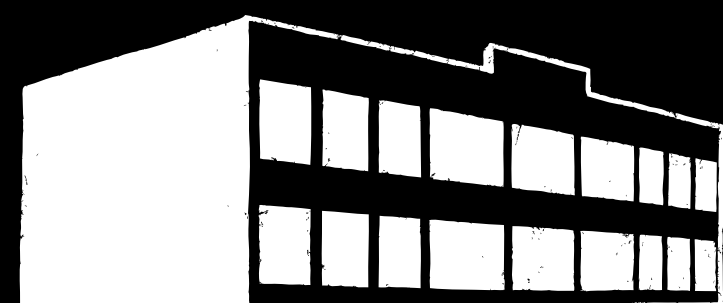
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Types of sour beer production

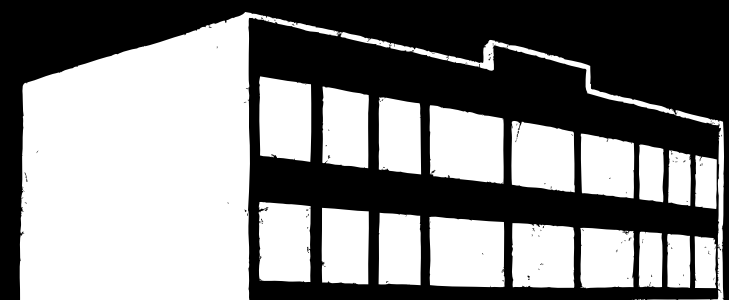
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Sour Mash	Kettle Souring	Fast Souring in Another Vessel
<p>Lactic Fermentation in the Mash after saccharification rest</p> <ul style="list-style-type: none"> -raise to mash out temps before run off -Clean Mash Tun really well 	<p>Lactic Fermentation in the Kettle</p> <ul style="list-style-type: none"> - Sour before boil if you want to kill all the Lacto or sour after boil if you want Lacto to live on in fermenter 	<p>Lactic Fermentation in carboy, corny keg, or fermenter</p> <ul style="list-style-type: none"> -Transfer to a fermentation vessel to sour then move back to kettle to finish beer
<ul style="list-style-type: none"> -Most difficult to control 	<ul style="list-style-type: none"> -Versatile -Easier to control 	<ul style="list-style-type: none"> -Maybe easier to keep at 85-120F for Homebrewers -Quicker turn around on Kettle for Production breweries



1. Mash and sparge like normal
2. If using Acid malt to drop pH to ~ 4.6 add after mash rest
3. Boil for at least 15 minutes to sterilize wort and kettle. Keep kettle as sanitary as possible like you would a fermenter at this point
4. Recirculate through heat exchanger to bring wort down to Lacto pitching temp
5. While dropping temp, add lactic acid to kettle to drop pH to ~ 4.6
6. ALSO while dropping temp, add steady stream of CO_2 to wort to purge out all oxygen
7. Add Lacto to kettle
8. Rouse with CO_2
9. Blanket top of kettle with CO_2
10. Keep kettle free of oxygen until target pH is reached
11. Boil and proceed as usual



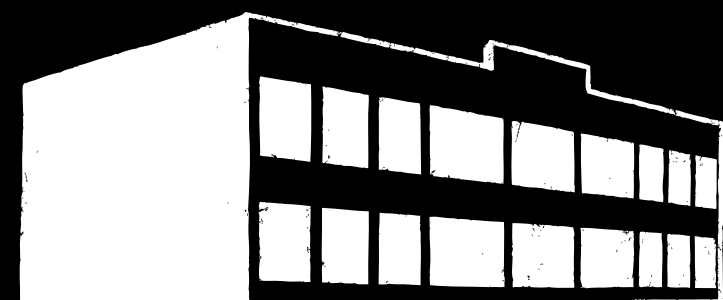
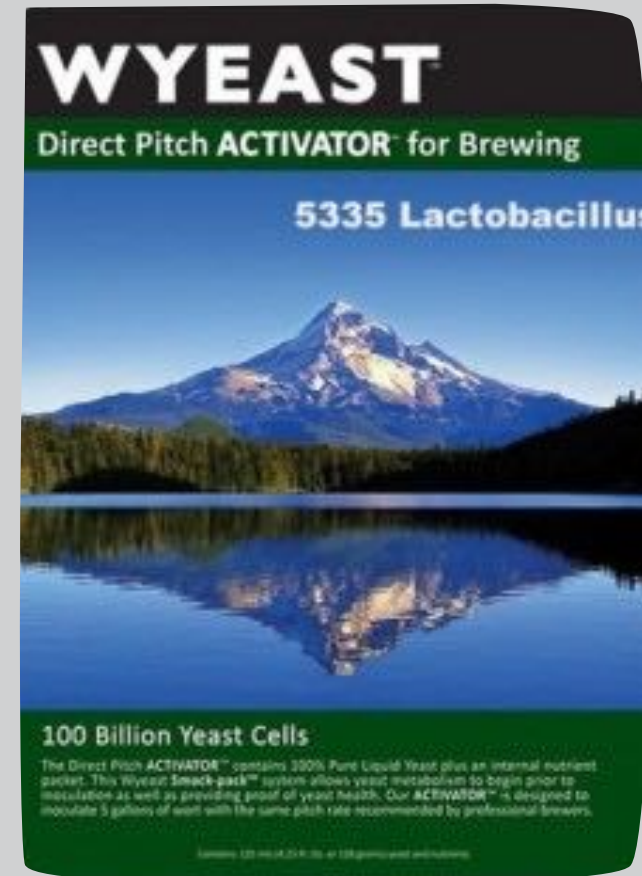
Grain

Lab Pitch

Probiotics

Yogurt

Sauerkraut and Kefir



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Sources of Lactobacillus

Undercurrent

FORT GEORGE BREWERY

O.G. 1.053 // F.G. 1.014

ABV 5.1% // IBU: N/A

10 bbl batch

Great Western 2-Row - 429lbs - 89.6%

Roasted Barley - 12lbs - 2.2%

Acidulated - 25lbs - 4.6%

Dextrose - 20lbs - 3.6%

Mosaic 4lbs

Lactic Acid 250 mL

Imp. Tartan (Scottish) ale Yeast

3 gallon lactobacillus starter

42lbs Black Currant Puree

pH drop in kettle souring 4.7 to 3.35

over 72 hours

Belly Full of Bugs

HOMEBREW

O.G. 1.035 // F.G. 1.009

ABV 3.4% // IBU: 7

5gal batch

Great Western Pilsner - 4.5 lbs - 53%

White Malted Wheat - 3.5 lbs - 41%

DME 0.5lbs - 6%

East Kent Golding 10g

Hull Melon 10g

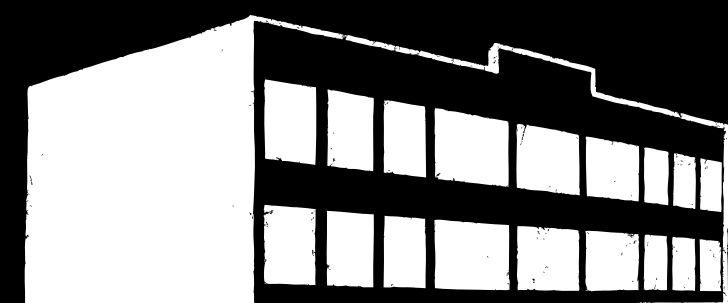
Lactic Acid 7mL

Lallemand Bry-97 West Coast Yeast

800ml lactobacillus starter

pH drop in kettle souring 5.35 to 3.35

over 96 hours

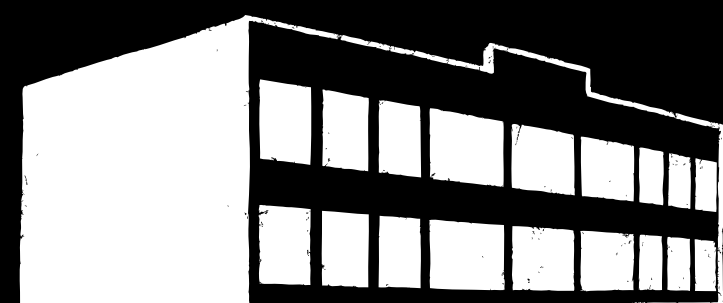
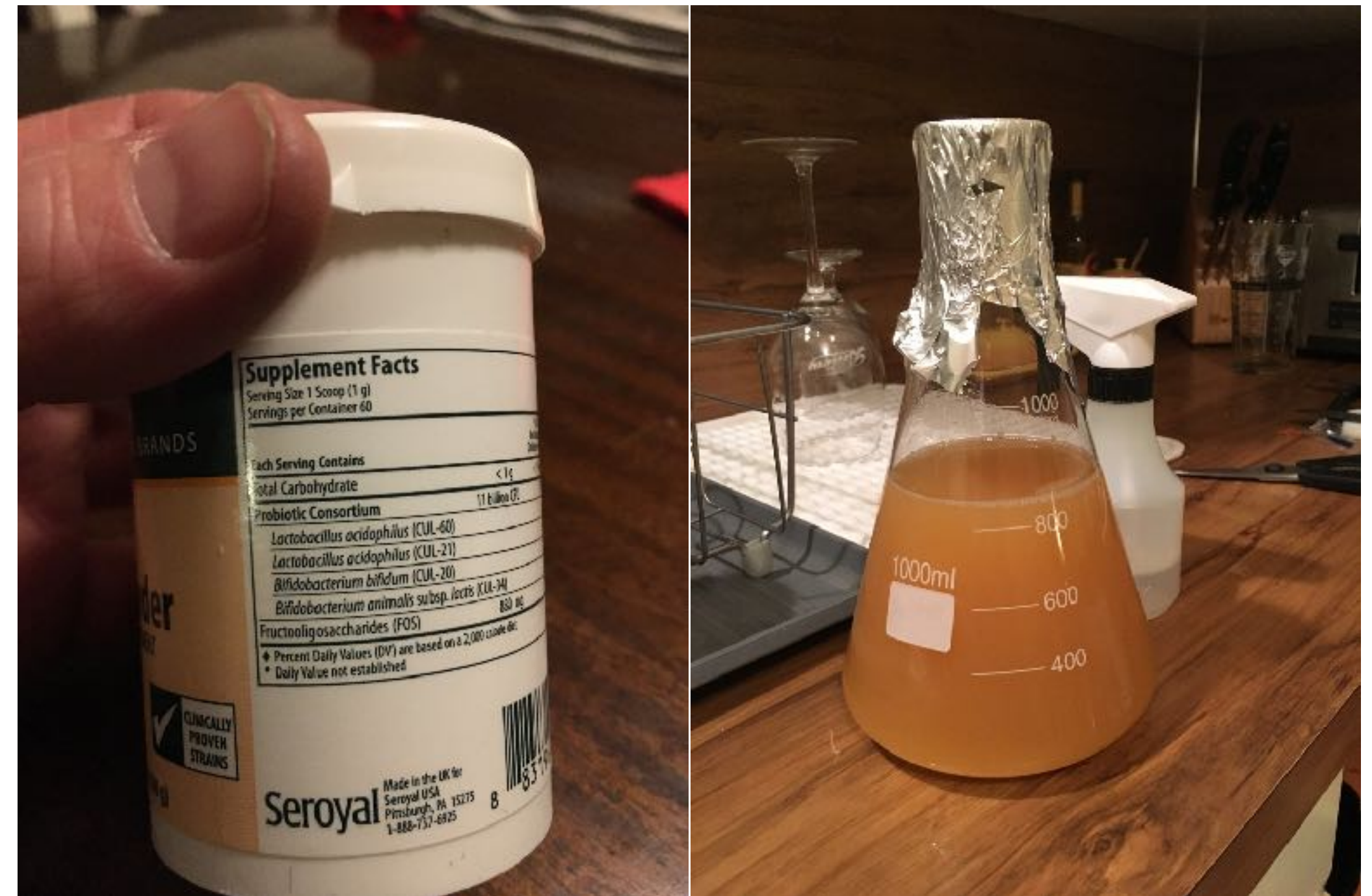


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Undercurrent



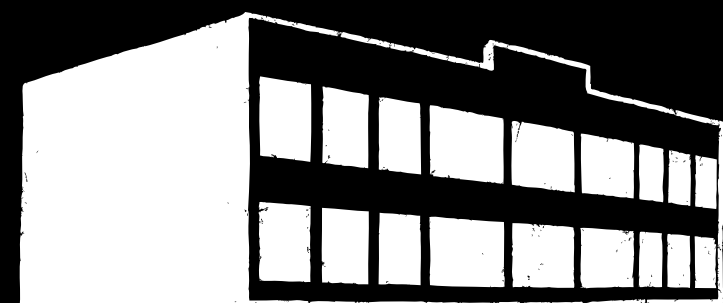
Belly Full of Bugs



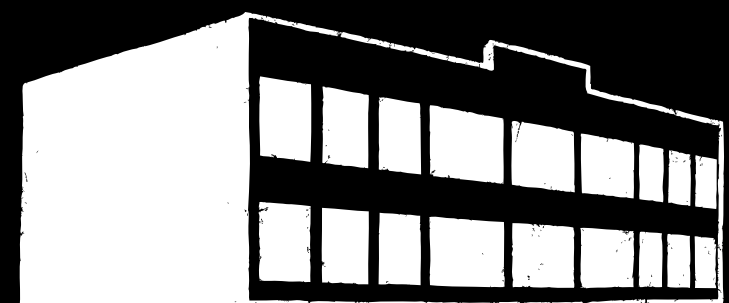
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Lacto Starter

Brew Day



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Mashing

Undercurrent

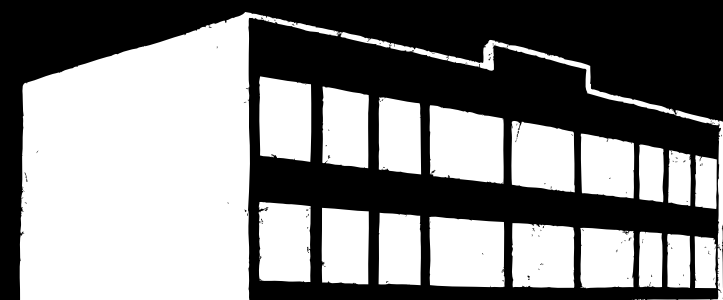
FORT GEORGE BREWERY

- Low mash temp
- Acidulated < 10%, usually 3-5%
- Lactic acid to make up rest of pH drop
- Clean crisp malts, sometimes use wheat and oats for body
- Mixed reviews on crystal and dark malts

Belly Full of Bugs

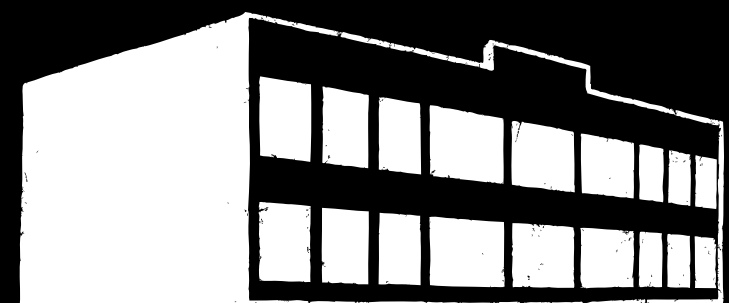
HOMEBREW

- Missed mash temp
- Target 149° // Actual 145°
- Left bag in kettle as I raised the temp to 170°
- may have helped attenuation



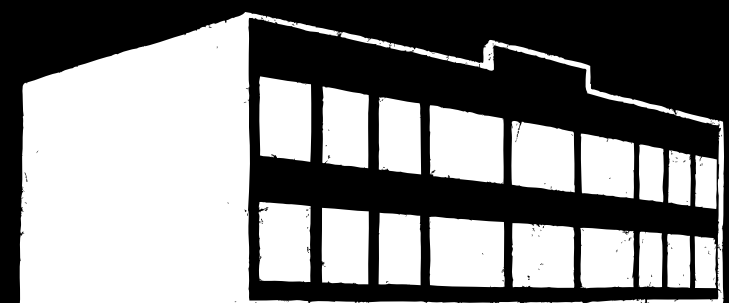
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Mashing



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First Boil



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Cooling for Lacto Fermentation

Undercurrent

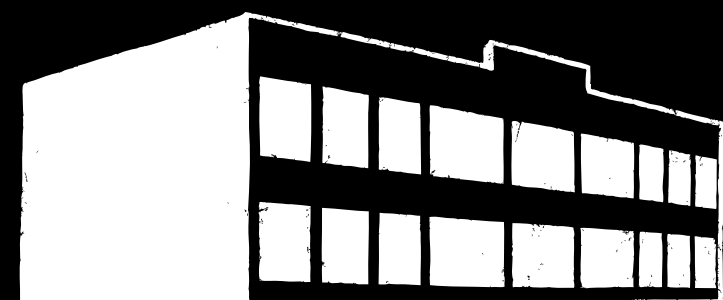
FORT GEORGE BREWERY

- Keep entire kettle consistent and not stratified for accurate temperature
- Constant CO₂ stream to purge out all oxygen to create anaerobic environment for lactobacillus
- This is when I add lactic acid to complete pH drop
- Remember to keep kettle sanitary and not introduce unwanted microbes

Belly Full of Bugs

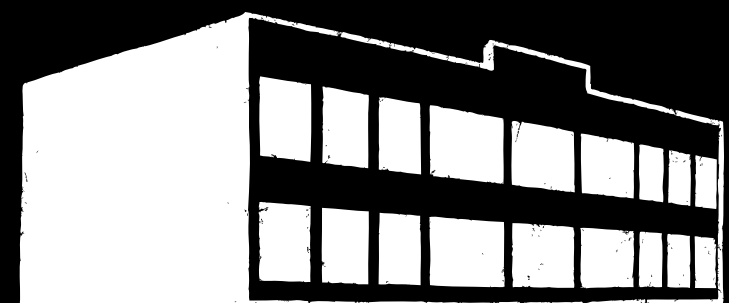
HOMEBREW

- Keeping O₂ out of wort while cooling slowly bubbling CO₂ in through kettle valve.
- If you don't have a valve maybe use a carb or Oxygenating stone.



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Cooling for Lacto Fermentation



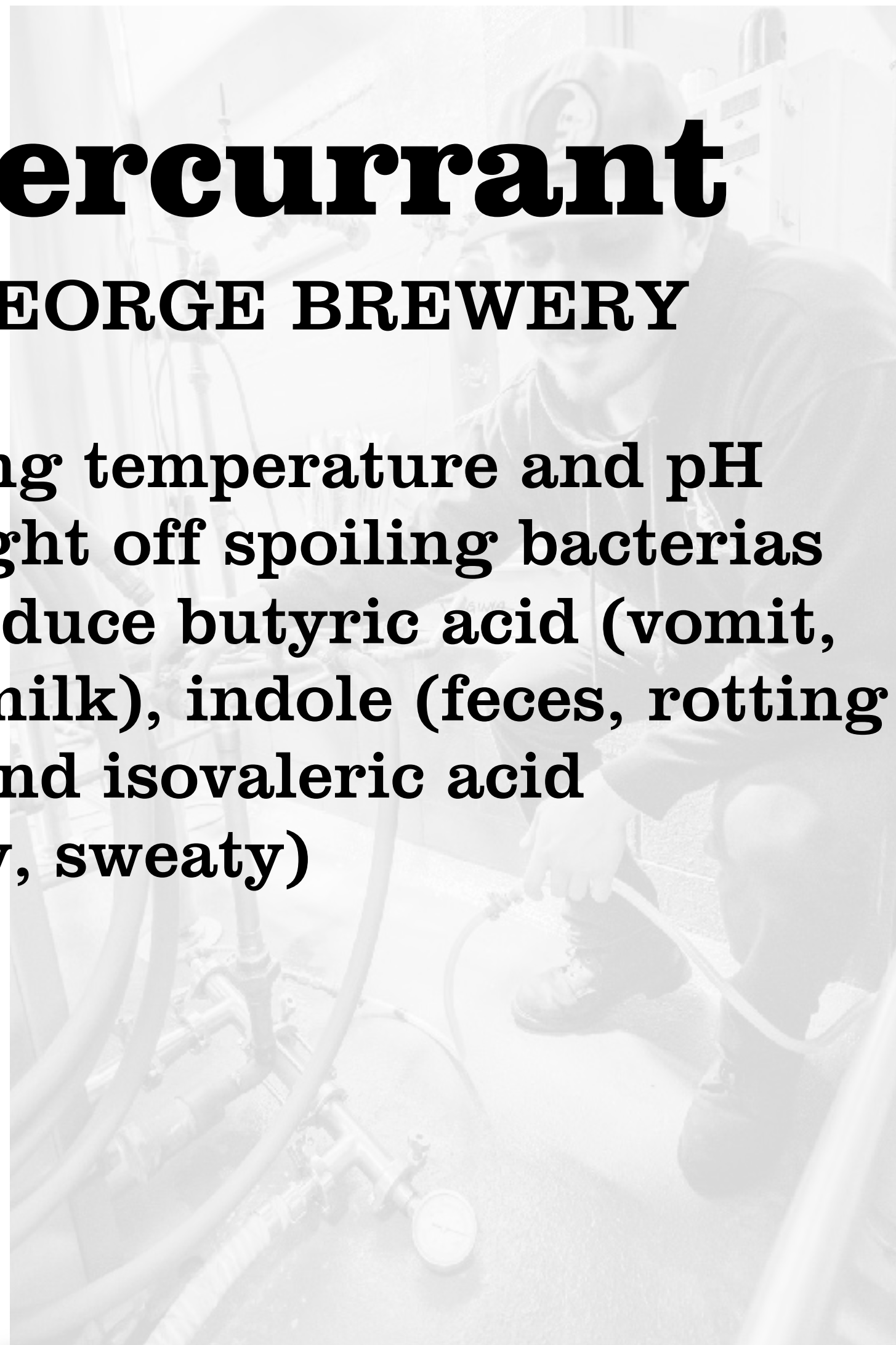
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Dropping pH to ~4.5

Undercurrent

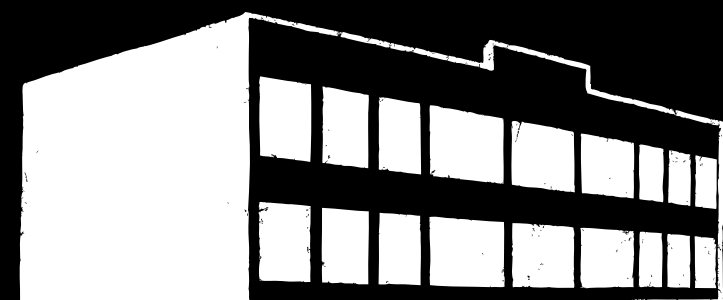
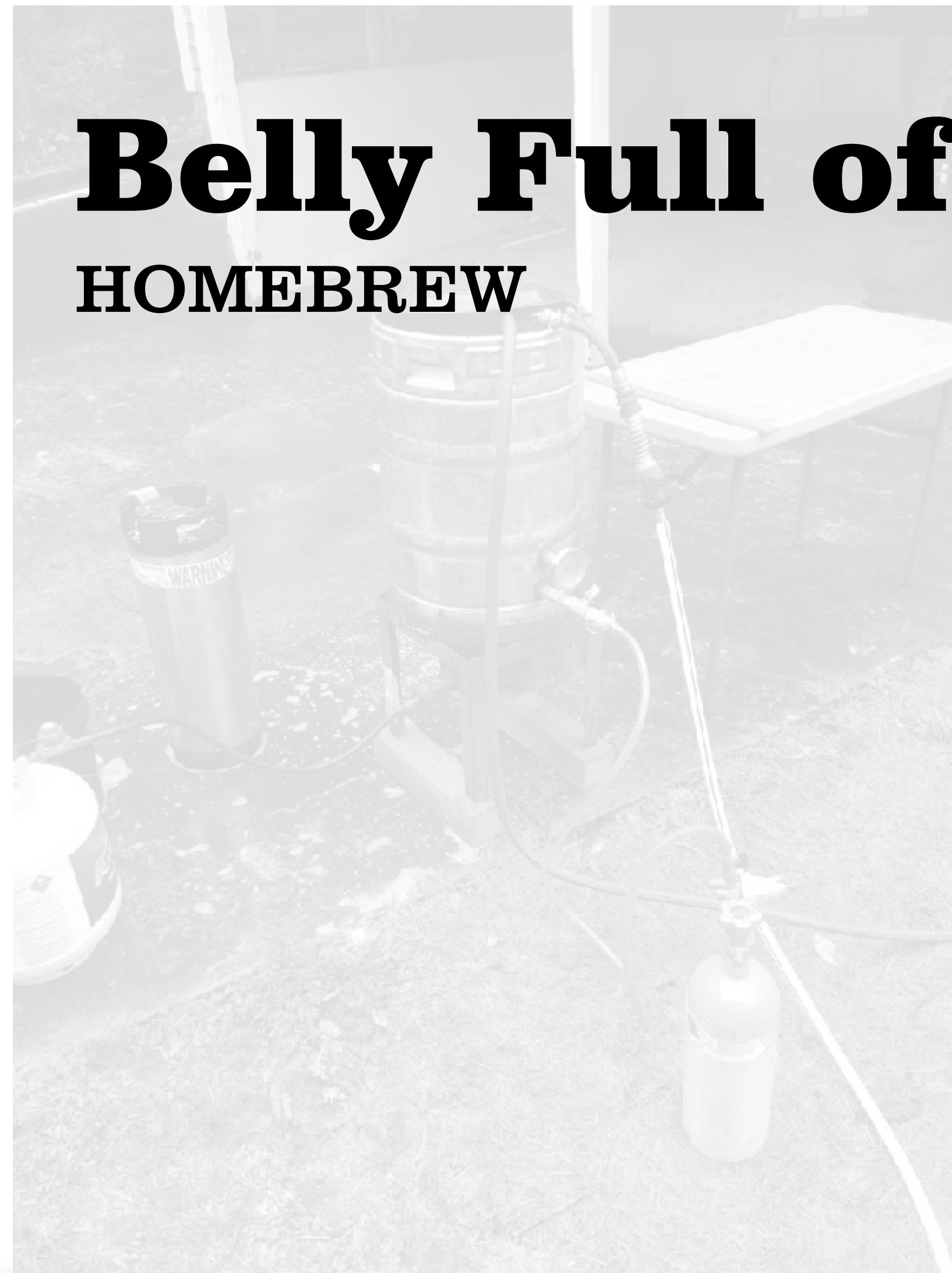
FORT GEORGE BREWERY

- Dropping temperature and pH helps fight off spoiling bacterias that produce butyric acid (vomit, rancid milk), indole (feces, rotting flesh), and isovaleric acid (cheesy, sweaty)



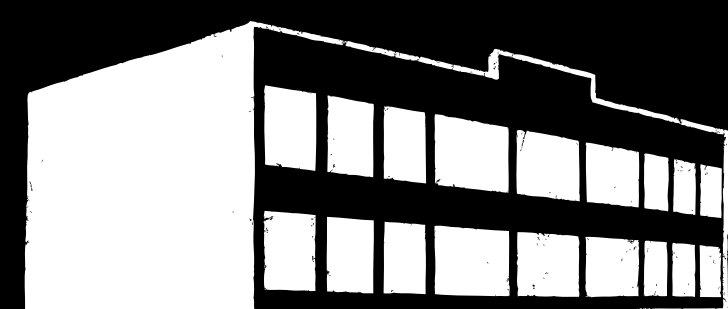
Belly Full of Bugs

HOMEBREW



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Dropping pH to ~4.5



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Pitching Lacto

Undercurrent

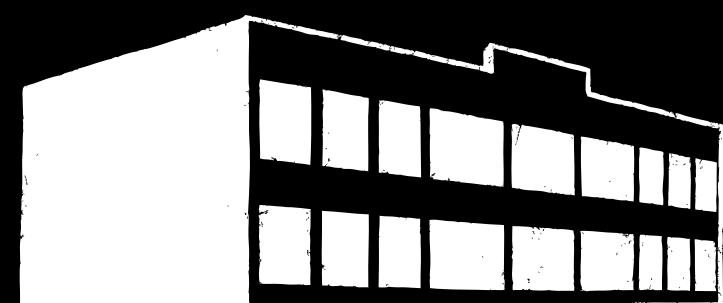
FORT GEORGE BREWERY

- Different temps for different Lacto strains, 85-115
- Different flavor profiles
- “propagating” in apple juice
- Tried harvesting, successful but need to keep cool and without pressure
- Homofermentative (glucose to lactic acid) vs heterofermentative (glucose to lactic acid, ethanol, acetic acid, and CO₂)

Belly Full of Bugs

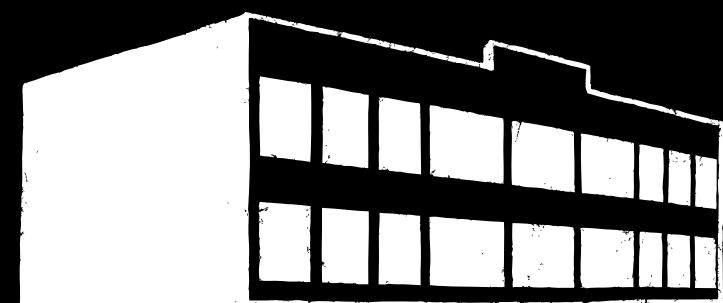
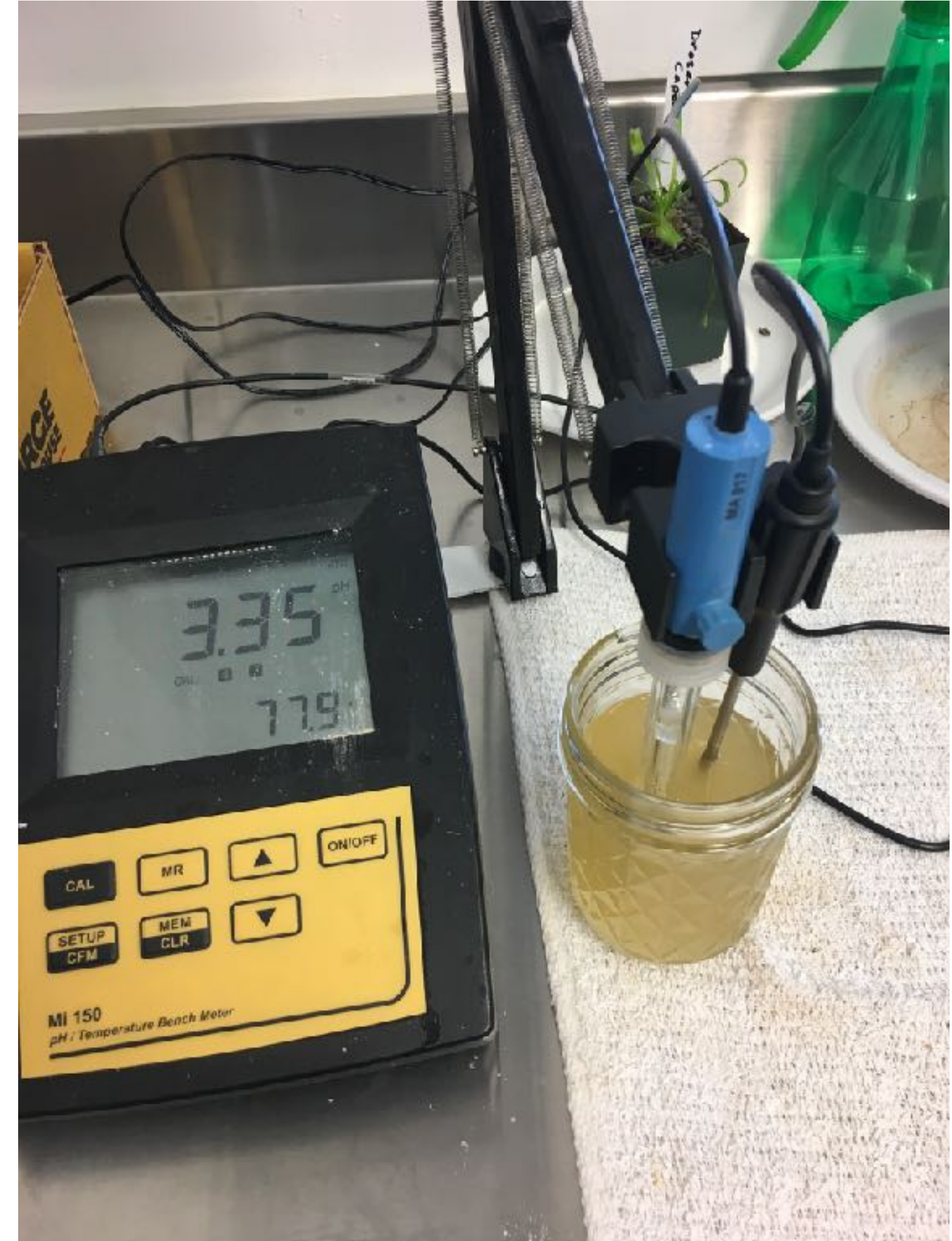
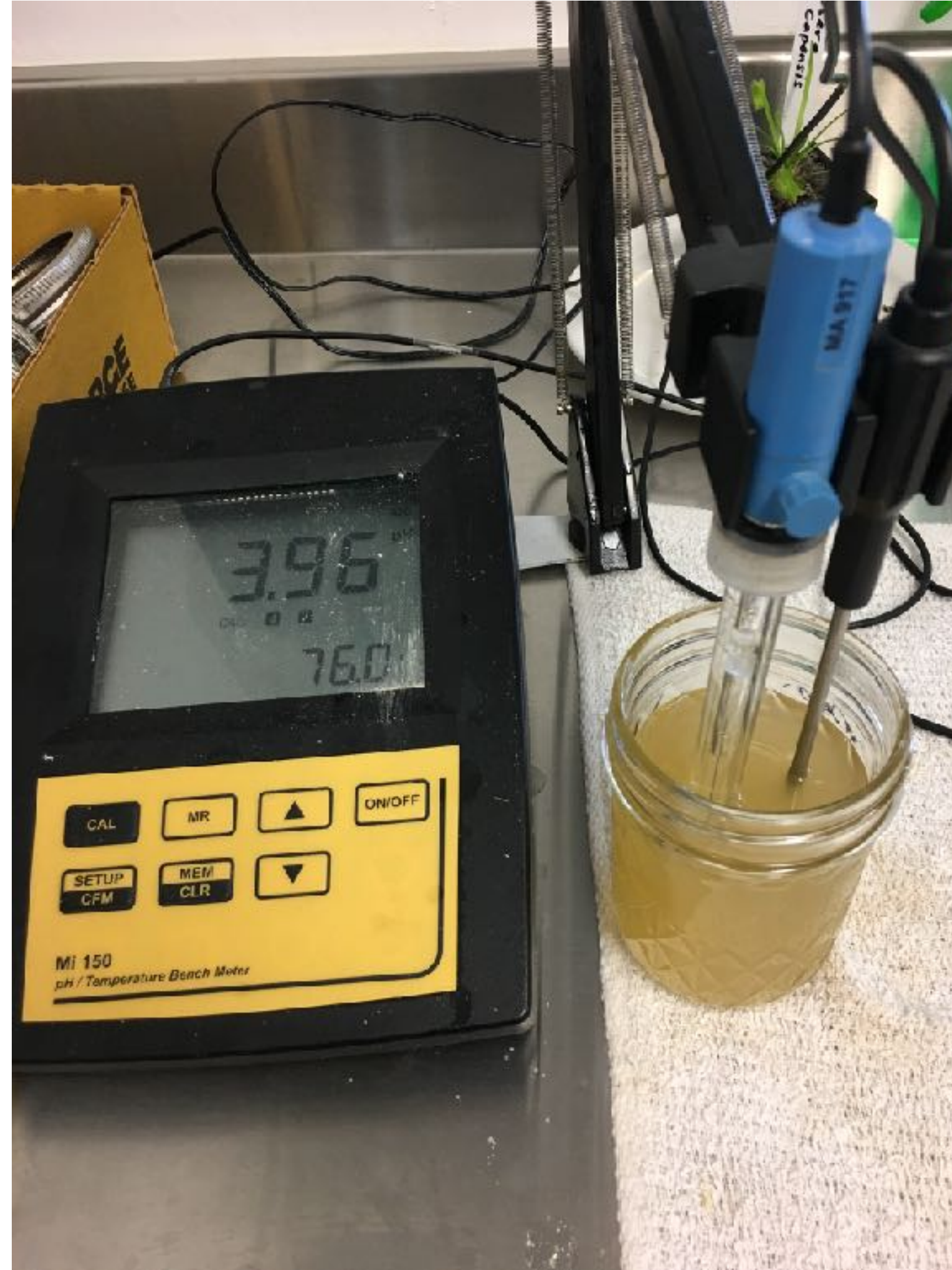
HOMEBREW

- Sacrificed one of my corny kegs for Sour projects
- Consider using Chalk (CaCO₃) for lacto starter to keep down acid levels, allowing Lacto to grow more.



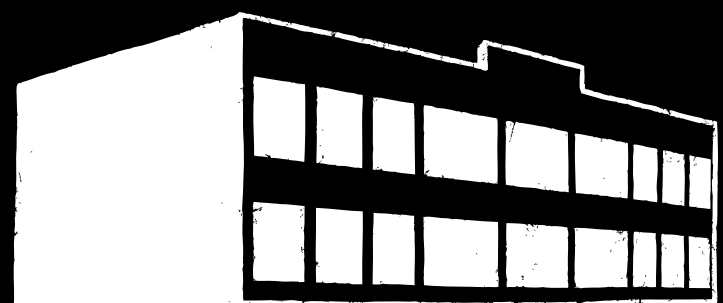
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Pitching Lacto



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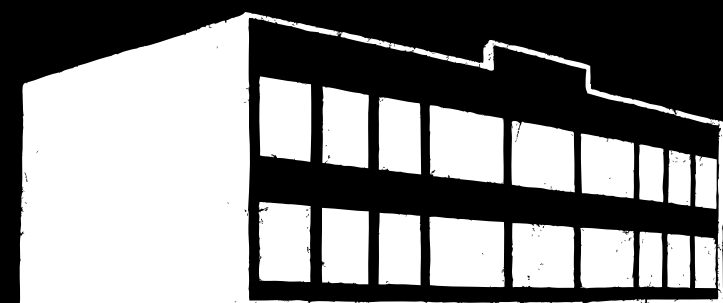
Monitoring pH



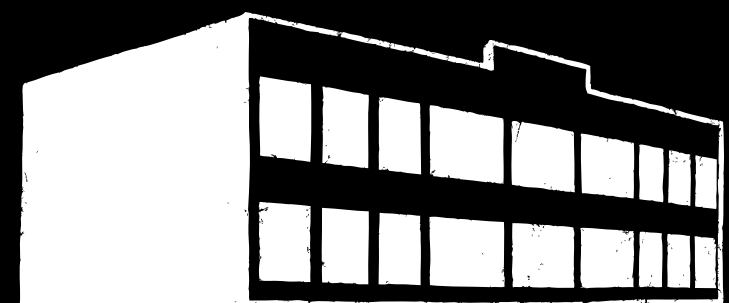
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Taco Break

Brew Day Part 2



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Second Boil

Undercurrent

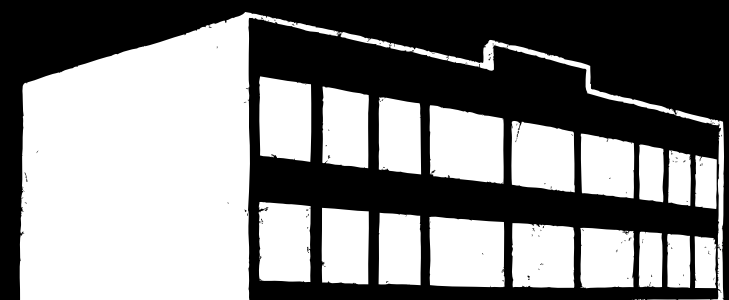
FORT GEORGE BREWERY

- Some brewers say quick boil, some say very long (boil off dms)
- Depends on malt used and flavor profile desired
- At least 30 minutes is a good idea to fully kill Lacto

Belly Full of Bugs

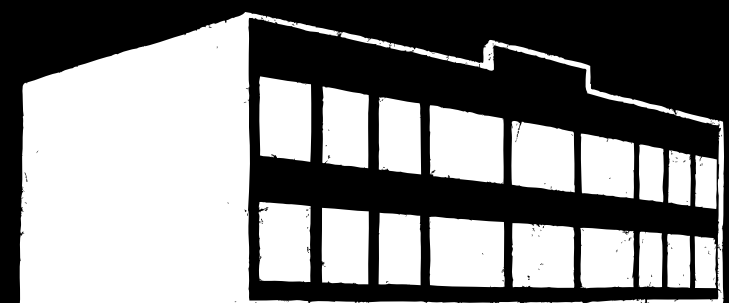
HOMEBREW

- Check Gravity 1.002 drop maybe normal. Any more may be contamination
- Plan hop additions for this amount
- Brewed on Stove top because it was snowy outside



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Second Boil



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Chilling and Pitching Yeast

Undercurrent

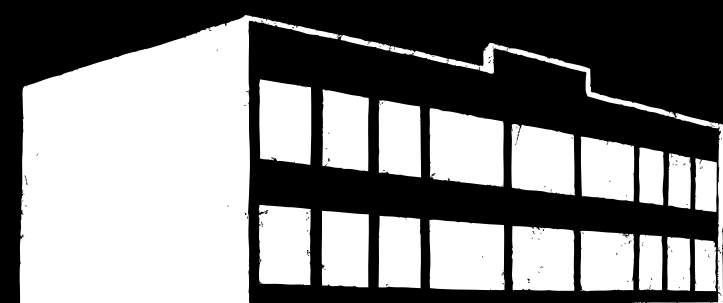
FORT GEORGE BREWERY

- Definitely aerate/oxygenate
- Ester production minimal at low pH
- Attenuation harder at low pH
- Brettanomyces with kettle sour - super clean production
- Anecdotal success conditioning on brett but not as primary

Belly Full of Bugs

HOMEBREW

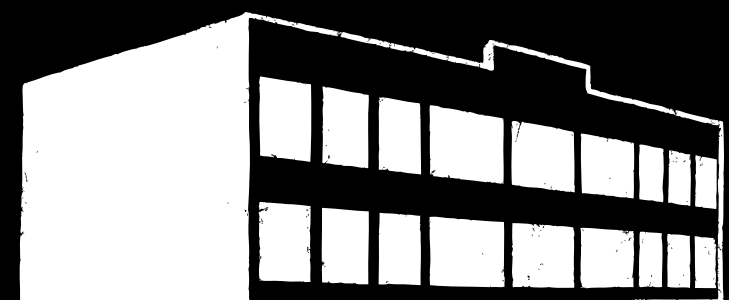
- Re-hydrated yeast
- Pitch twice as much because of lower pH
- Make yeast starter if there is time



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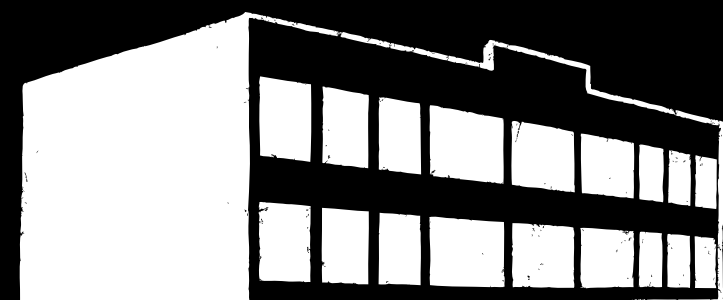
Chilling and Pitching Yeast

- **Pucker Pie** - strawberry & rhubarb
- **Eat a Peach** - peaches
- **Cherries & Berries** - two types of cherries & blackberries
- **Abracadabra** - "traditional berlinerweisse"
- **Gose Bump in the Night** - black gose
- **Hocus Pocus** - Abracadabra with cranberries
- **Brown Eyed Girl** - brown sour
- **Tea Rex** - arnold palmer (black tea & lemon peel)
- **Sucker Punch** - lemon & lime peel
- **Chasing the Dragon** - dragonfruit, kiwi, and black currant
- **Undercurrant** - black currant

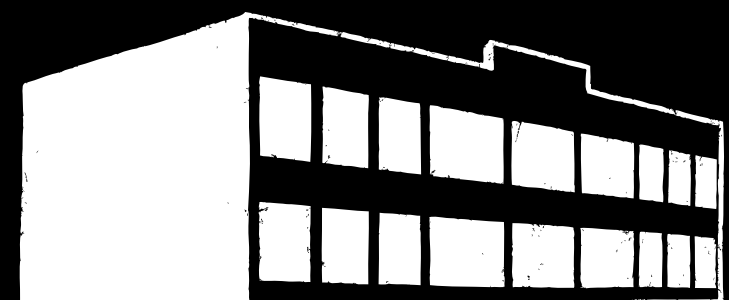


- 1. Pre-acidify wort pH to 4.5**
- 2. Keeping Wort warm (85-120F)**
- 3. Keeping wort as sanitary and oxygen free as possible**
- 4. Microwaving a steak – Jamil Zainasheff**

While a starting pH of 4.5 will generally eliminate the risk of bacteria that can cause food poisoning, use caution when tasting the results of a sour mash. Only a low pH and the presence of alcohol from yeast fermentation can ensure that your fermented product is safe to drink. –Sour Beer Blog



- **American Sour Beers**- Michael Tonsmeire
- **themadfermentationist.com**
- **CBC talk from Breakside, The Commons, and Gigantic**
- **Milk the Funk - wiki/facebook group**
- **The Sour Hour - Brewing Network podcast**
- **sourbeerblog.com**



Questions?

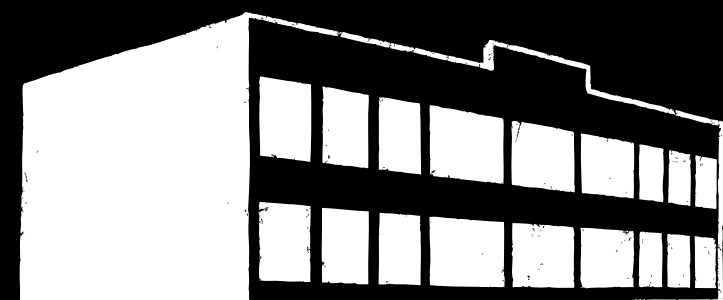
No hard ones.

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David Coyne

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