

ACIDIFICATION IN WOODEN BARRELS

An Overview of NBB Theory and Practice

(PLUS SOME LACTO ONLY SOURING FOR ADDED EXTRA FUN)



Sour Science Workshop
June 17th, 2015
Kelly Tretter-New Belgium Brewing





BREWER /
BLENDER

ERIC
SALAZAR



A woman with long dark hair, wearing a black dress and glasses, is shown in profile, holding a small glass of wine up to her nose to smell it. She is standing in a wine cellar, with a large wooden barrel in the foreground on the left and a larger wooden structure, possibly a fermenter or storage tank, in the background. The lighting is warm and focused on the woman and the wine glass. The background shows wooden staves and metal bands of the barrel structure.

SENSORY
SPECIALIST/
WOOD CELLAR
MANAGER &
BLENDER

LAUREN
MICHELLE
SALAZAR

BREWMASTER
PETER
BOUCKAERT





LA FOLIE BOTTLING 1999

madness, insanity



LA FOLIE BOTTLING 1999

Follow Your Folly



LA FOLIE BOTTLING 1999

**In French, it means you're
kind of nuts, but you're fun
to hang out with-Peter Bouckaert**



LA FOLIE BOTTLING 1999





THE REZ





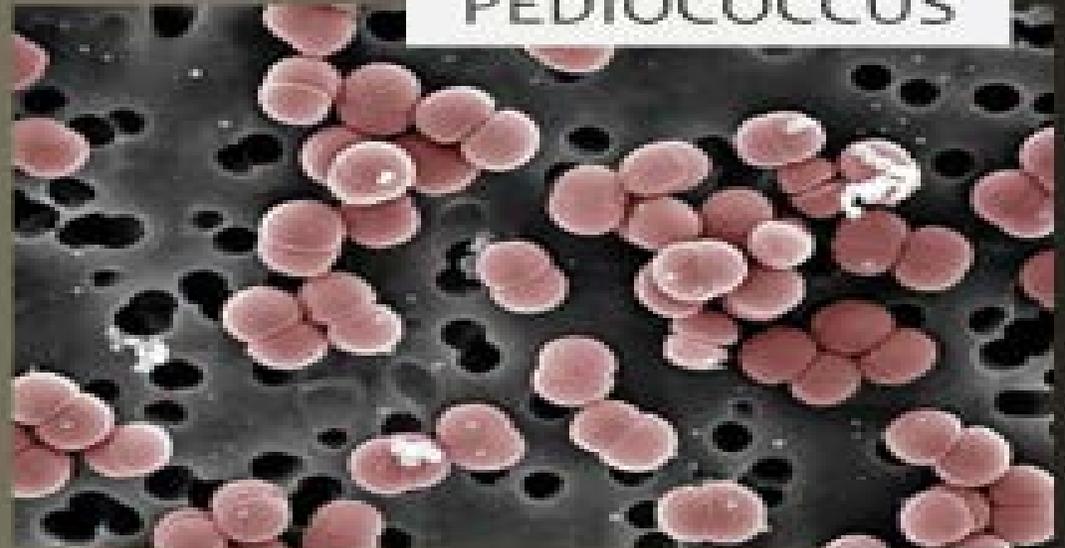


SOURING BACTERIA

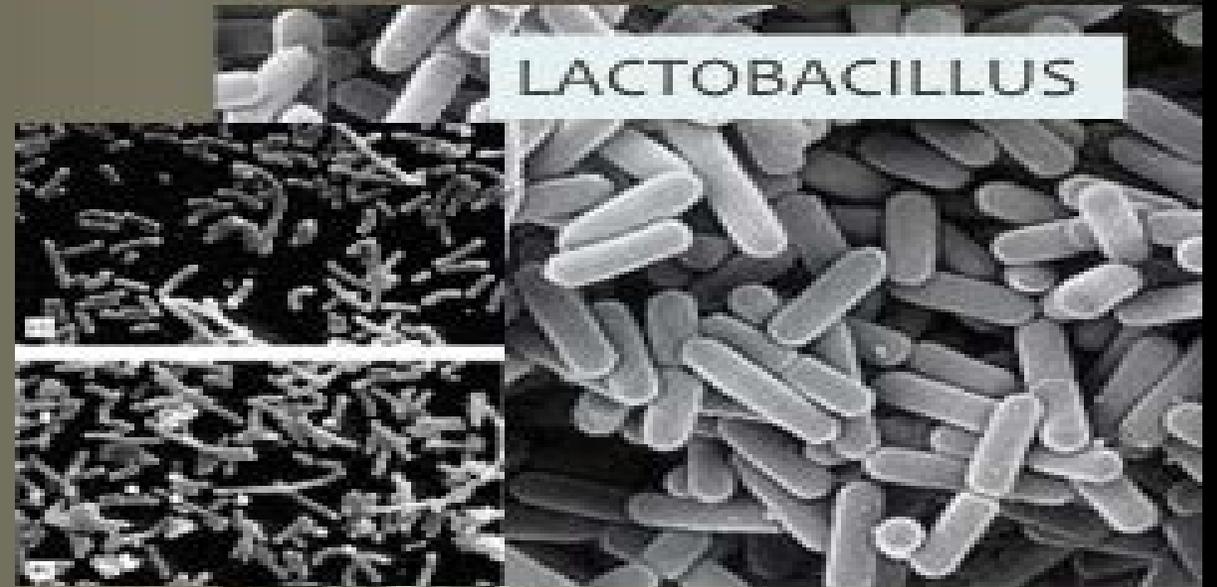


PEDIO & LACTO

PEDIOCOCCUS



LACTOBACILLUS



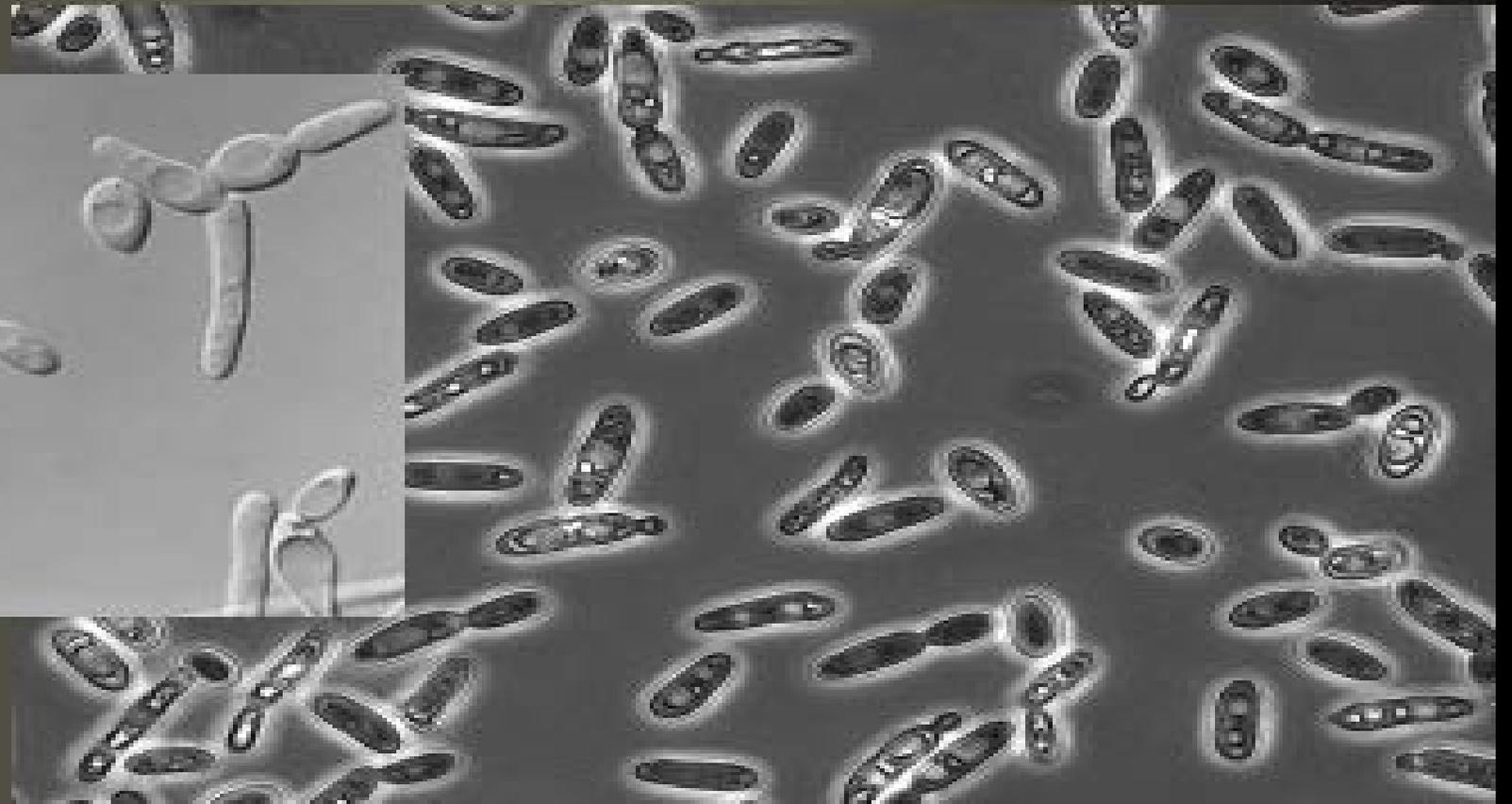
Lactobacillus spp.

- Yogurt
- Primary souring bacteria
- Thrives between 38-49oC
- Softer and tangier lactic acid
- Lowers pH to 3.3-3.4

Pediococcus spp.

- Acidification of sauerkraut and dried sausages
- Slower than *Lacto* to sour
- More hop tolerant
- Reduce the pH in beer to <3.0
- Sharper and more harsh lactic acid
- Goes through its' 'sick' phase
- *Pedio* can't take up diacetyl so it's nice to have some brett in your "soup"

WILD YEAST



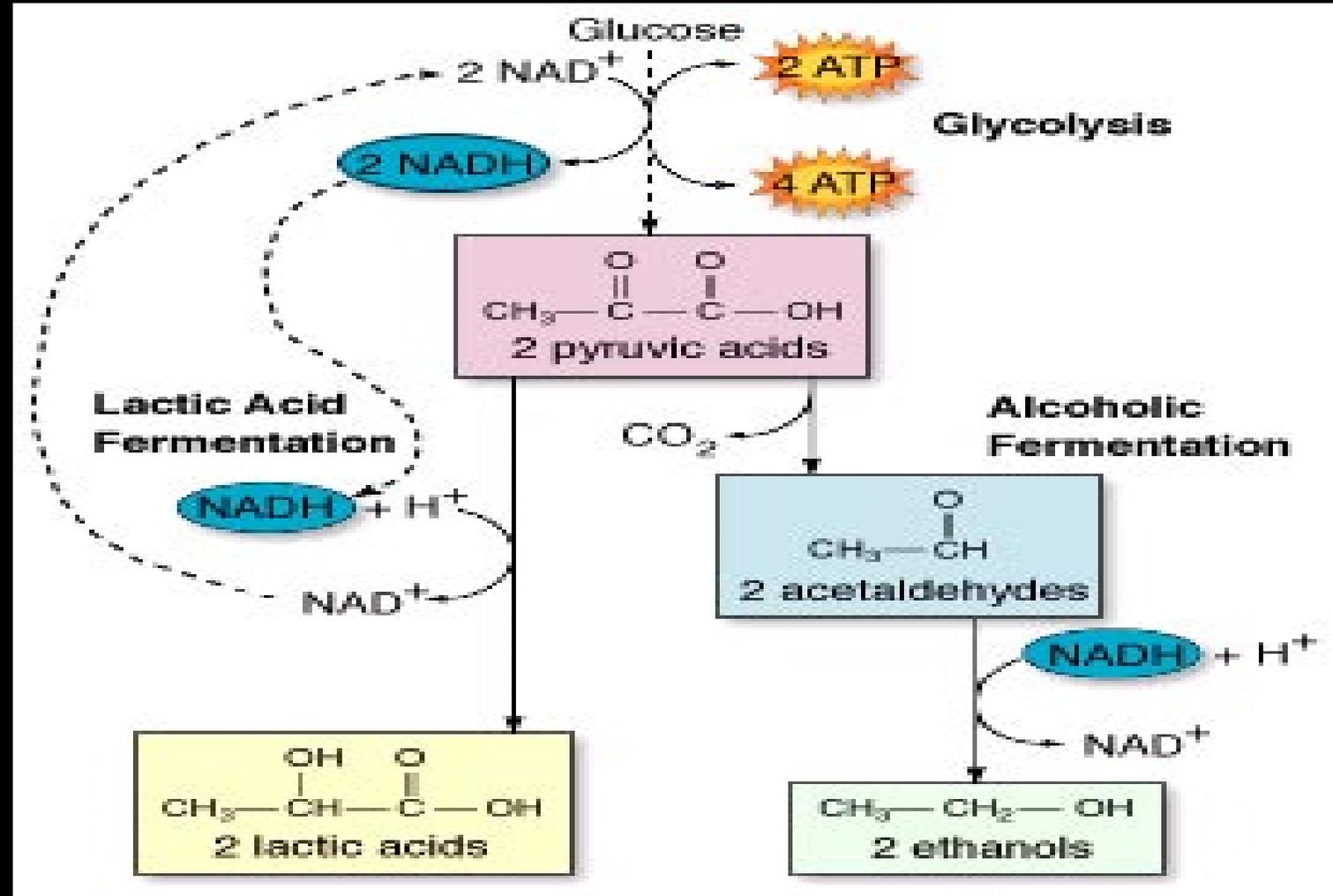
Brettanomyces spp.

- Alpha-glucosidase breaks down dextrans
- Doesn't contribute a lot of acidity unless there is a lot of O₂ present=acetic acid!
- Lactic acid + Brett= ethyl lactate



- A LOT of lactic acid can be bad, though

SCIENCE



The Odd Couple

Jack Klugman and
Tony Randall



Season One



109909A

OSCAR



FELIX



420909

What yeast to choose?



JUNE 2011

taste for Clutch = Kick

- F01 - U.S. V. cherry fruit
- F02 - B.S. sweet fruit of honey
- F04 - U.S. tart, white + flat
- F05 - W.S. berry Malty in sour
- F07 - W.S. over the top fruit taste
- F08 - W.S. berry Malty
- F09 - B.S. still berry but different fruit?
- F11 - B.S. fruit taste + very little sour
- F12 - B.S. good one really like
- F13 - W.S. beer - good beer
- F15 - W.S. great and crazy flavors
- F16 - W.S. beer - creamy - good creamy

- F03 - Candy Stone Peach USA
- F06 - peach tart B.S.
- F10 - berry peach B/W
- F13 - HOLY SHIT! PEACH USA

CLUTCH

F01	40
F04	40
F15	30
<hr/>	
	110

KICK

F03	= 50
F13	= 85
<hr/>	
	135
	↓
	110

LaFolie? NOT NOW taste in AUG before.

-> PEACH

Fri. August 19th 2011

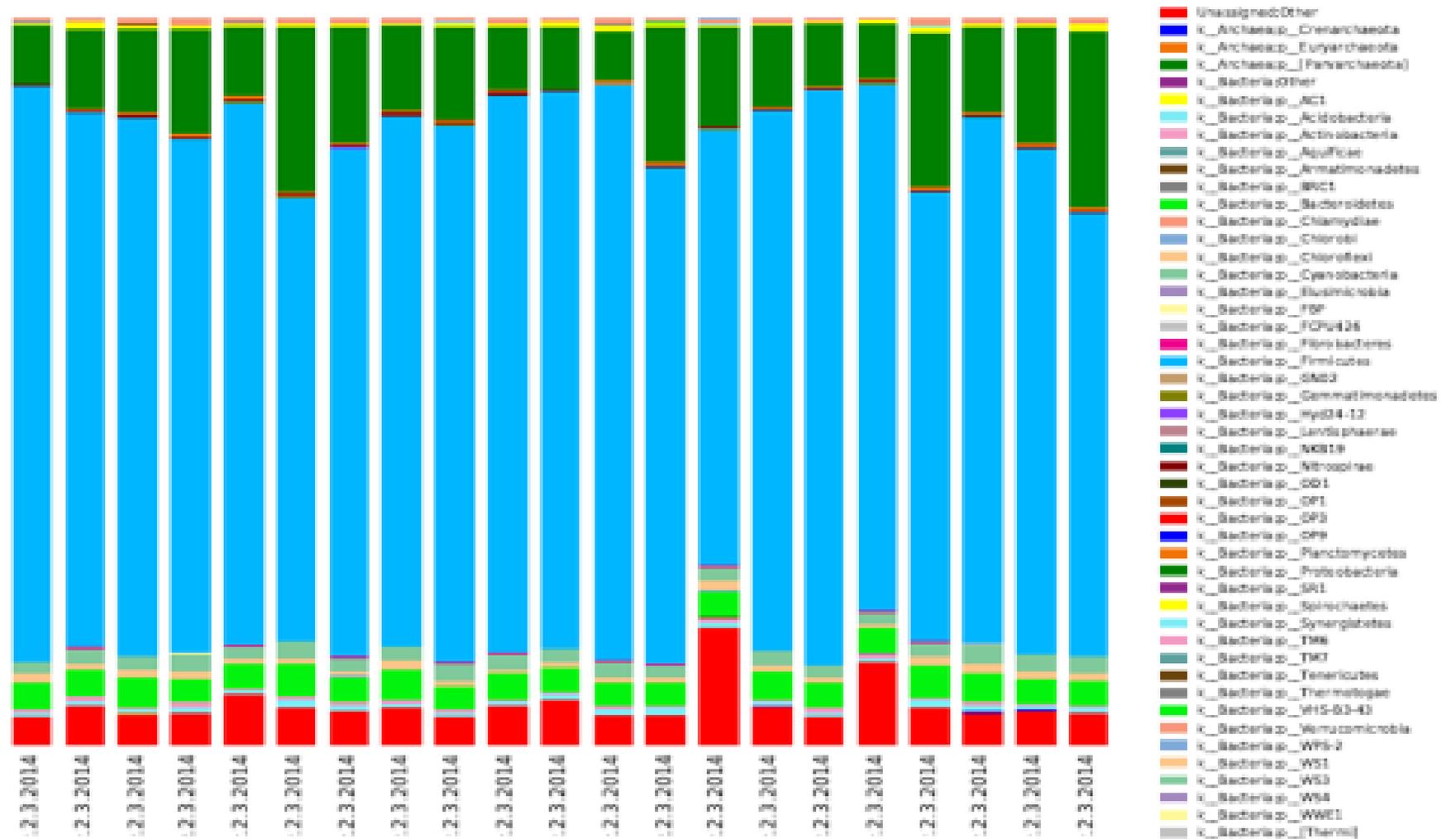
taste all.

BILLY (O) - ~35 new
KEVIN (E) - empty

- F01 W: fruit tart cherry, sticky drink
- F02 W: better than 1 more berry sour.
- F03 W: nice peachy not as tart but punches back FF
- F04 B: slug nice start tart. almost FF
- F05 W: beer on the way to good.
- F06 W: nice one!! YES awesome apricot goodness.
- F07 W: beer on the way - good still berry.
- F08 W: beer " " " to good.
- F09 B: ok - nice one. great. almost it
- F10 B: OMB yummm. juicy fruit gum, not sour but delicious
- F11 B: yummm cherry cola / berry / not malt flavor
- F12 B: tartness - almost nice real clean (finally). zingy
- F13 B: peachy aroma, yeasty yummm. like 10
- F14 W: berry cola ->
- F15 W: WTF - poop - phenolic/medicinal NOT
- F16 B: thank god nice one luscious. almost
- F17 W: totally beer -> (real nice) sweet (more sour)!
- F18 W: same as 17 + 1/2. strawberry

Diversity of Life in the Spontaneous Ferments of One Brewery

In the ~50 barrels of one brewery, ~200 organisms from ~50 different groups of Bacteria & Archaea were found.





COMMON MISTAKES



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- Don't mess with the pellicle. *Ever.*
- *Taking too much sample from the top.*
- Poor yeast selection for primary fermentation
- **Buying your wood sight unseen**
- **Hydrating too *quickly***



A sour barrel is a *hungry* barrel. If you keep them happy and well they will do nice things for you-
Lauren Salazar

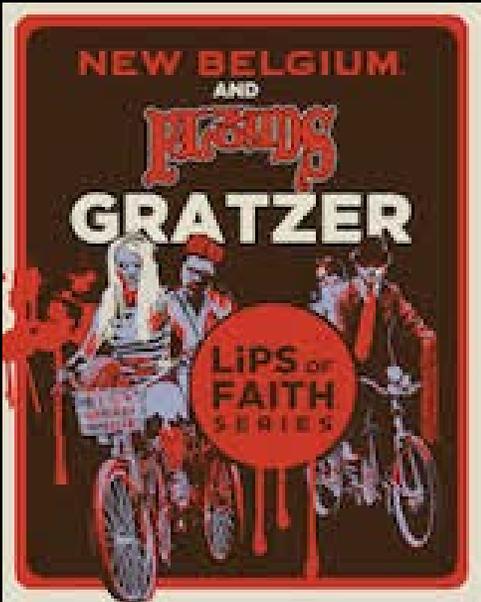


Souring in Stainless!



Souring in Stainless!

- Lactobacillus isolated from our brew house
- Propagated in the lab in unhopped wort in controlled environment
- Once it reaches the TA we desire we step it up into the Lacto Reaction Vessel (LRV)-Total Capacity of 360hL
- Once the LRV reaches desired TA the sour wort is moved back through kettle and boiled
- Add it to whatever you want!



Foeders vs Stainless

Foeders vs Stainless

	Foeders	Stainless
Organism(s)	100's	1
Base	beer	unhopped wort
Temp	controlled as much as possible	<i>REALLY</i> controlled
Time	years	HOURS



ACKNOWLEDGEMENTS

A sour barrel is a *hungry* barrel. If you keep them happy and well they will do nice things for you-Lauren Salazar

- *Lauren Salazar-New Belgium Brewing*
- *Eric Salazar-New Belgium Brewing*
- *Peter Bouckaert-New Belgium*
- *Micro Lab-New Belgium*
- *Dr. Paul Ogg-Colorado School of Mines, Golden Colorado*
- *ASBC*
- *New Belgium*



Paul Ogg



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