A Perspective on Brewing Berliner Weisse-style Beer… *WITH BEER!*

Jess Caudill – Wyeast Laboratories Inc.

Jason Kahler – Solera Brewery

What is Berliner Weisse?

Wheat beer ~50:50

OG ~1.030, FG ~1.004

Alcohol ~3.5% by volume

IBUs ~5

What is Berliner Weisse?

pH 3.0-3.3.

Total Acidity (TA)
as lactic acid
0.6% -0.8%
(6000-8000ppm)

It’s sour!

Personal Berliner Weisse History

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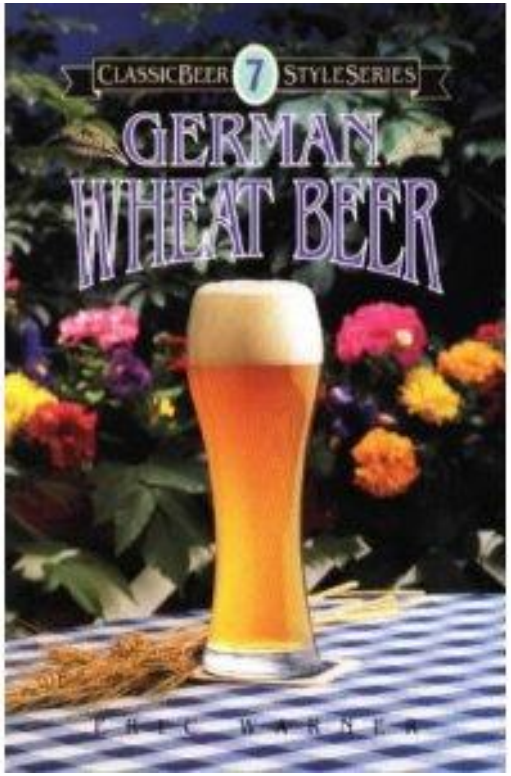


German Wheat Beer by
Eric Wagner

4-6 parts yeast : 1 part *Lactobacillus delbruckii*

Ferment and age at 56°F

Personal Berliner Weisse History

1 part L. brevis : 5 parts 1007 (German Ale yeast)

Ferment and age at 56^{o}F

At bottling time, more Lactobacillus

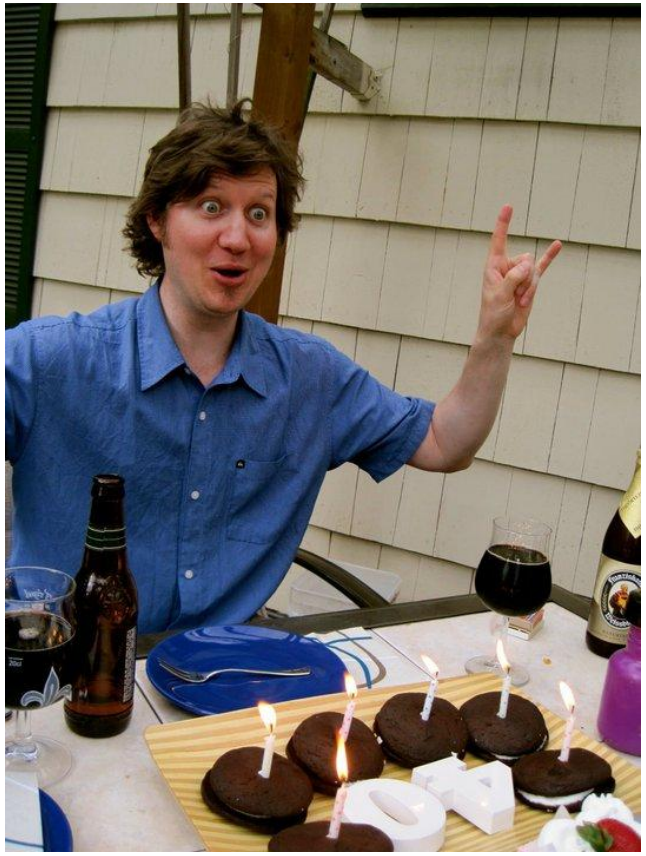
At bottling time, for fun, Brettanomyces

Personal Berliner Weisse History

Not sour enough… not really close

Interesting results tasting Brettanomyces beers
(Germans said so)

Personal Berliner Weisse History



Alan Taylor:
-German Brewmaster
-Speaks German
-Wife is German

Interviewed a Berlier weisse Brewmaster, and too notes

Different specifications:

- *5 Parts 5335 Lactobacillus buchneri*
- *1 Part yeast (1056)*
- *68oF fermentation temps*
- *1 million cells/ml Brettanomyces*

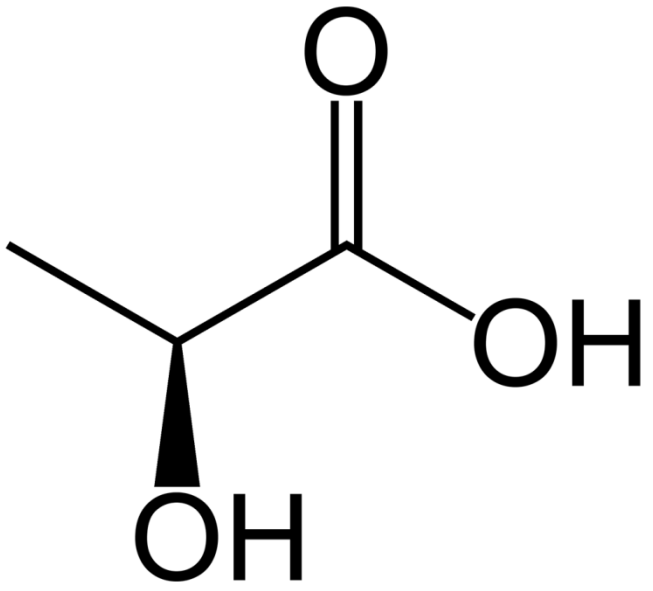
Personal Berliner Weisse History

Multiple trials. Still not where we wanted it.

Not sour enough… closer

What now?

New Approach



Need more acid production

Where do we get the acid?

- *Yeast*
- *Lactobacillus*

Which yeast is best?

Lactobacillus

- *How much do we need*
- *Pitch with, before or after yeast*

Choosing Saccharomyces

- Searched pH data, best 10 acid producers
- Weeded out strains that would not fit flavor profile
- Results: 1007 and 2124
- 1007 … German Ale, makes sense.
- 2124 … German lager, cool. Clean at warmer temps, also produces more acid than other strains

Testing Saccharomyces

- Mini fermentation tube trials
  - Saccharomyces Only (3 million cells/ml)
  - Saccharomyces w/ Lactobacillus (15 million cells/ml)

Testing Saccharomyces

Mini Tube Fermentations

-15ml wort per tube

-8^{o}P DME wort

-20^{o}C

-pH and Gravity

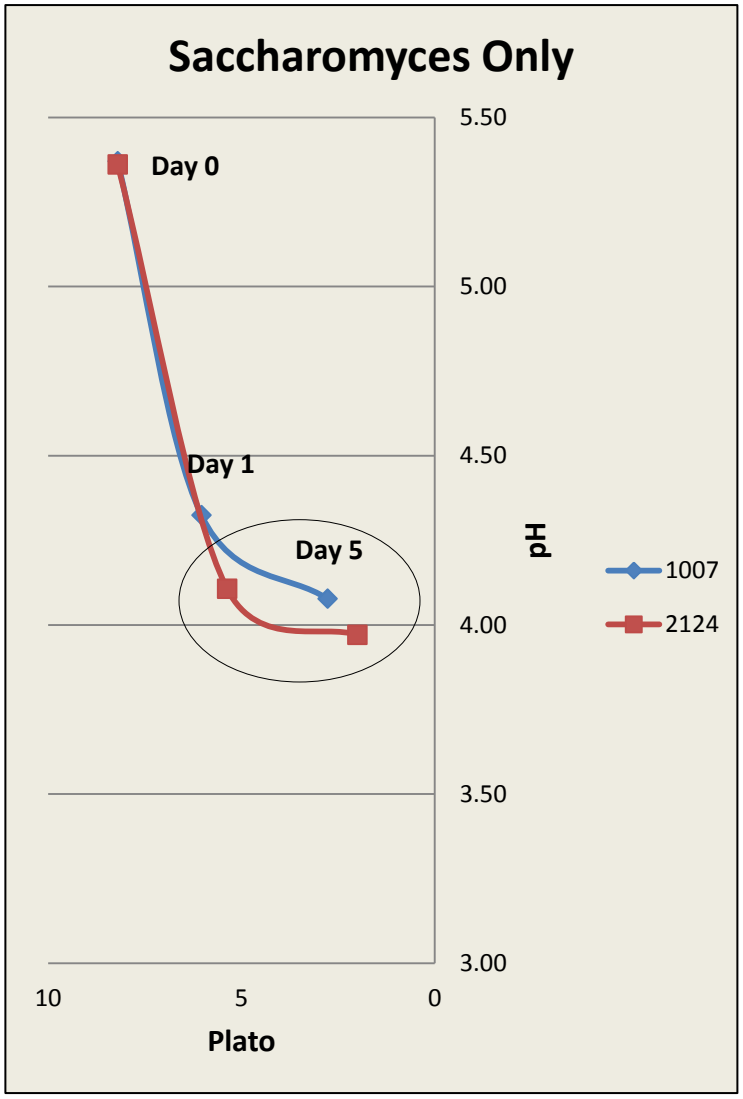
-destructive sampling at day 0,1 and 5.

Testing Saccharomyces

Anton Paar DMA 35 Digital Density Meter

Used to determine density on small samples

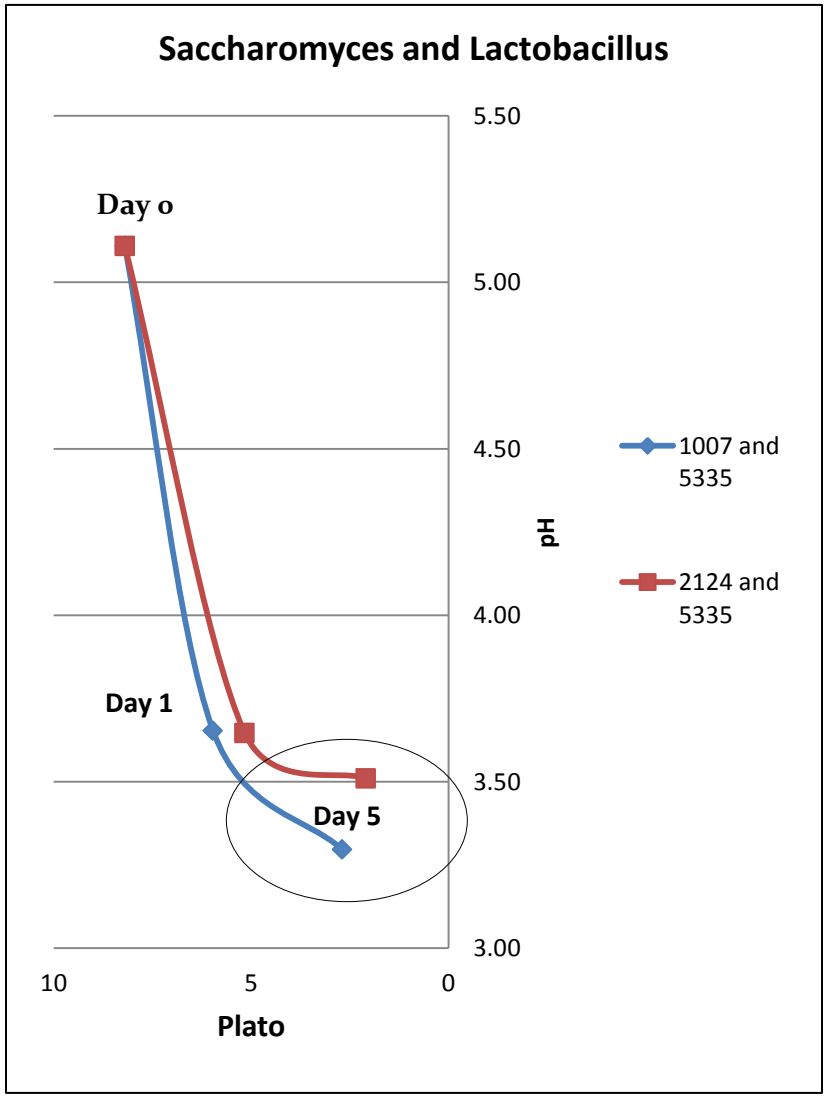
Testing Saccharomyces



Both look comparable, drop in pH per drop in Plato,

1007 slowing a little, but not a lot.

Testing Saccharomyces



1007 drop in pH per drop in Plato higher throughout

2124 flattening out around 3.50pH, 1007 pH continuing to drop.

Conclusions of 1007 vs. 2124

- Which is true?
  - 1007 more tolerant to lower pH, allows for a final beer with a lower pH, higher acid?
  - 2124 works faster, therefor inhibiting Lactobacillus growth, which decreases amount of acid production
  - Considering the Saccharomyces only data, the latter is probably the case
  - Proceed with 1007, as it will work and is a more traditional choice

Testing Lactobacillus 5335

- How much 5335 do we need to use?
  - Lactobacillus at *15 million* cells/ml, *5 million* cells/ml or at *1 million* cells/ml

Testing Lactobacillus 5335

Mini Tube Fermentations

-15ml wort per tube

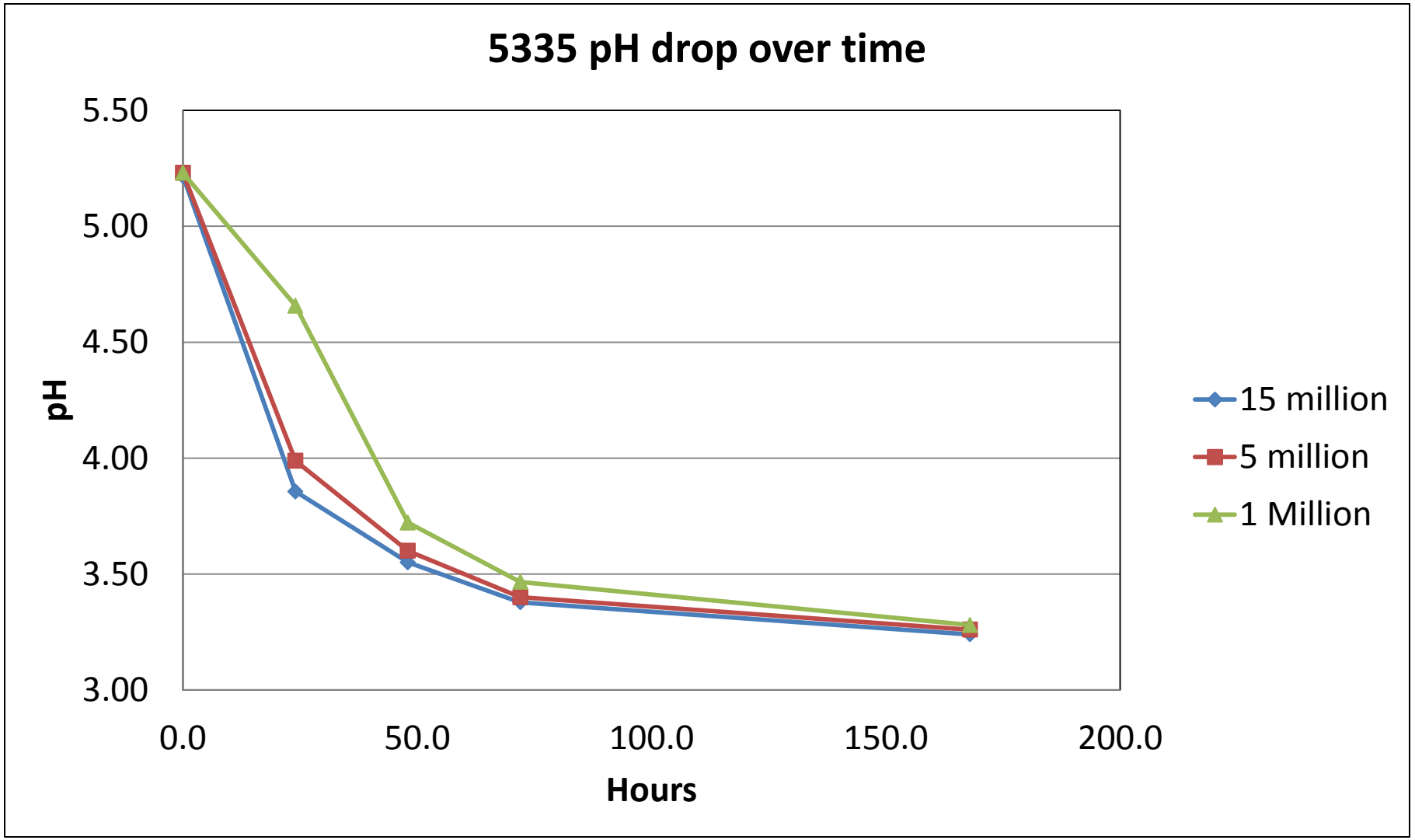
-8^{o}P DME wort

-20^{o}C

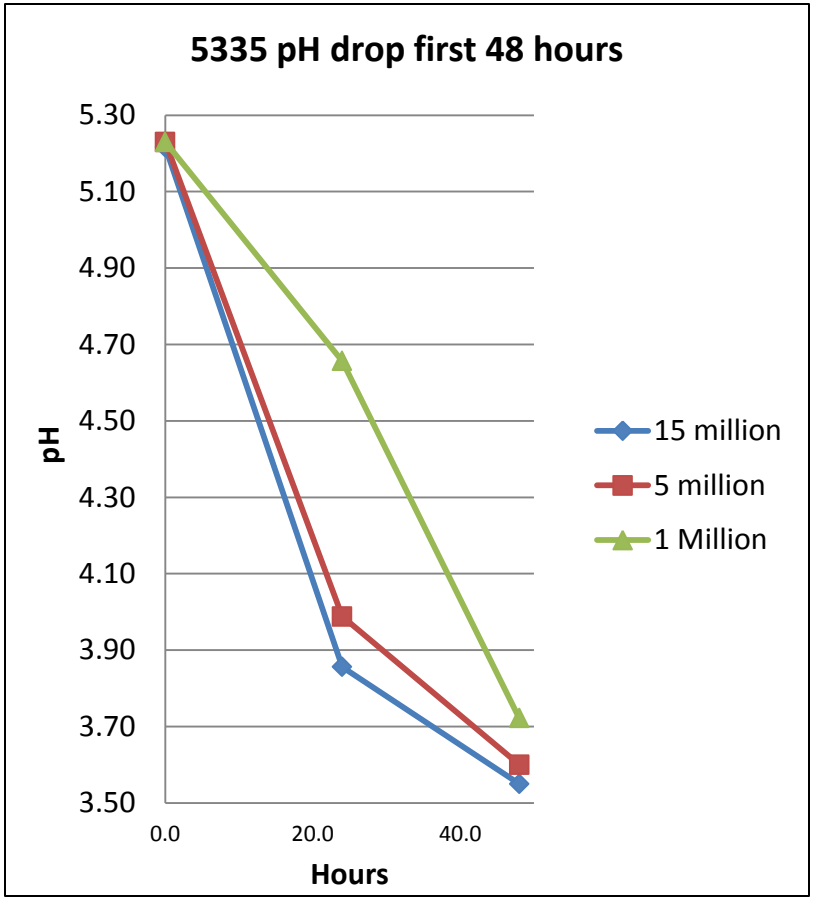
-pH and Gravity

-destructive sampling at day 0,1,2,3 and 7

Testing Lactobacillus 5335



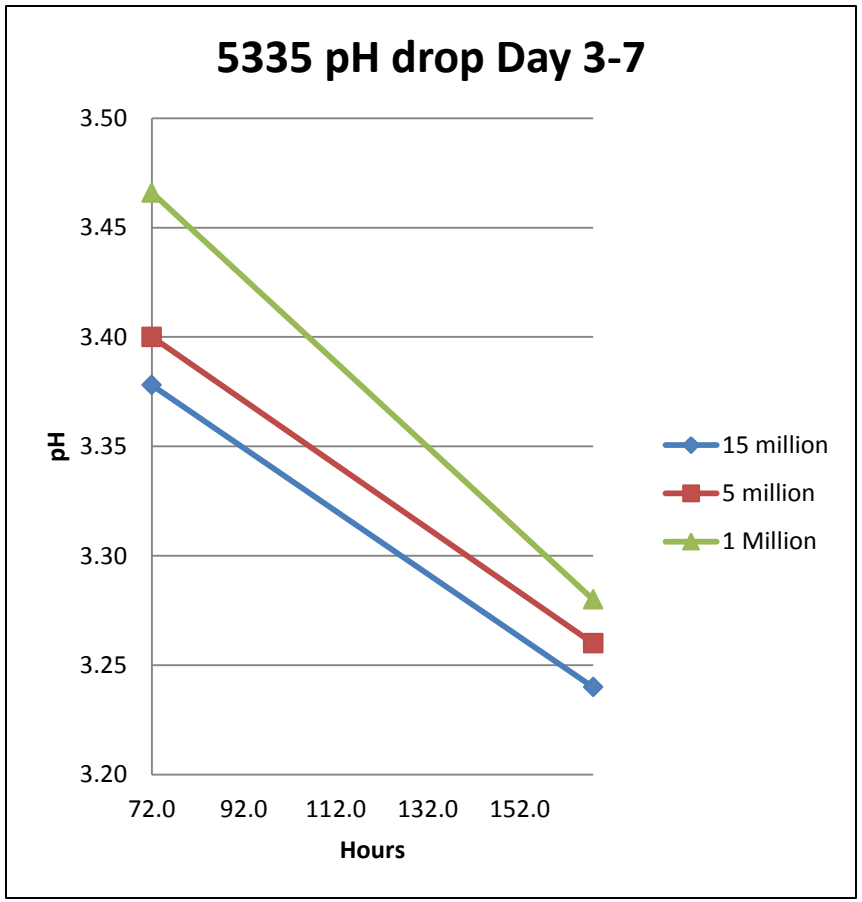
Testing Lactobacillus 5335



15 million cells/ml and 5 million comparable rate

1 million much longer lag and higher pH throughout

Testing Lactobacillus 5335



- 15 million cells/ml and 5 million same rate
- 1 million comes close to the same final pH in 7 days
- 1 million takes about 48 hours longer to hit 3.35 that the 15 million

Conclusions of 5335 Tests

- 1 million cells/ml not enough for fast and safe souring
- 5 and 15 million cells gave comperable results
- 15 million a little faster
- Will utilize 10 million cells/ml
- Consistent with some previous recommendations

How should we pitch yeast and bacteria?

- Should we pitch the Lactobacillus 5335 with German Ale yeast 1007 or 5335 before 1007?

- 150 ml flask mini fermentations with Total Acidity (TA) analysis
  - pH does not show the whole story

Testing pitch timing

Flask 150ml mini fermentations

-150ml wort per flask

-8°P DME wort

-20°C

-1007 3 million cells/ml

-5335 10 million cells/ml

-Total acidity (as % Lactic acid) titration at day 7*

*****(day 14 for one flask)***

1007
7 Days

Filter and test Total Acidity

5335
7 Days

Filter and test Total Acidity

5335 and 1007
7 days

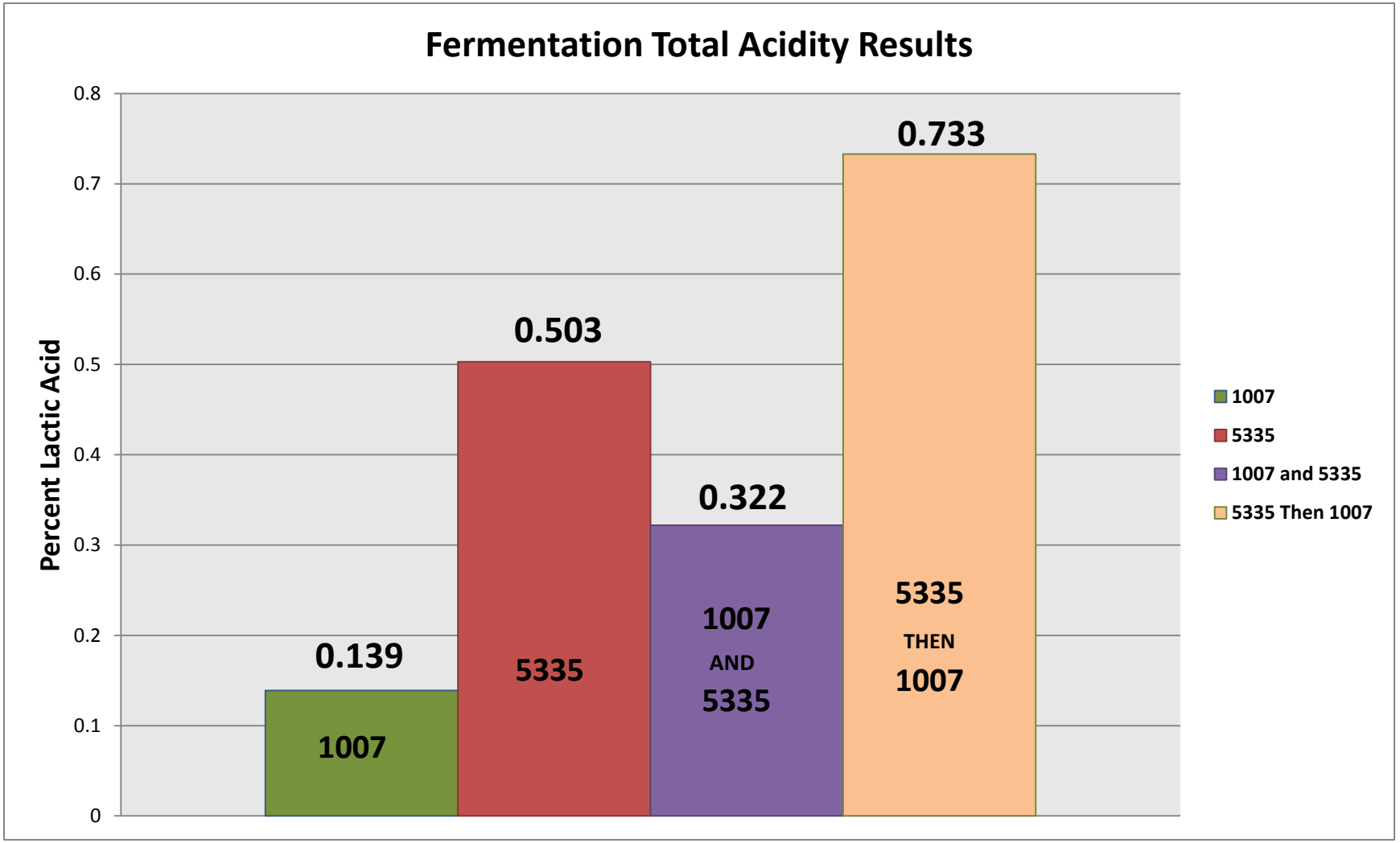
Filter and test Total Acidity

5335
7 Days

Add 1007
7 more days

Filter and test Total Acidity

Total acidity results



Conclusions of Pitching Order Tests

- Pitching 1007 with 5335 inhibits 5335
- Pitching only 5335, better acid production than 1007 and 5335,
  - Still need to deal with the remaining sugar
- Pitching separately, 5335 then 1007, gives maximum acid production and most sour beer

What about Brettanomyces?

- 1 million cells/ml at time of bottling, 5526 *B. lambicus*
  - *Lower pitch rate, flavor development mild from 1-3 months*
  - *Stronger brett character at 6 months*
  - *Delicate brett character desired over extremely strong brett profile*
  - *Higher pitch rates may produce stronger flavor in shorter time, though final brett character may be too much*

Conclusions and Notes

IBUs ~5, 5335
doesn't like hops

Try some Brettanomyces
In the bottles

1007 works well and
2124 is an interesting
option

Lactobacillus at
10million cells/ml

Pitch Lactobacillus
then yeast

For 10 million Lactobacillus cells/ml in 5 gal make a 1L 1.020 starter, grow 5-7 days at 70-80^{o}F

Time for practical test

- Jason Kahler
  - Brewmaster and co-owener of Solera Brewery
    - Parkdale, Oregon

Solera Berliner brew

Solera Berliner	2/22/2012

Malt Bill

Malt	Pounds	Percent
Weyerman Pilsner malt	165	62
Rahr malted white wheat	100	38

Mash Schedule

Time	Procedure
10:20	Mash in with 160 strike. Equalize at 150. Rest 60 minutes
11:40-12:00	Sparge at 170. (initial run-off 14oP)

Boil

Start Time

12:30

Kettle Time	Clock	Hops	Weight	Alpha
0 min	12:30	Czech saaz	1 medium pellet	Unknown

Boil End	Total Time	Volume	Gravity
1:00	30 min	6 Bbl	8.8 P

Run-in	Total Volume
	6 Bbl
NO O2, Fermenter purged with CO2	

OG FINAL	pH FINAL
8.8 P	5.76

Solera Berliner brew

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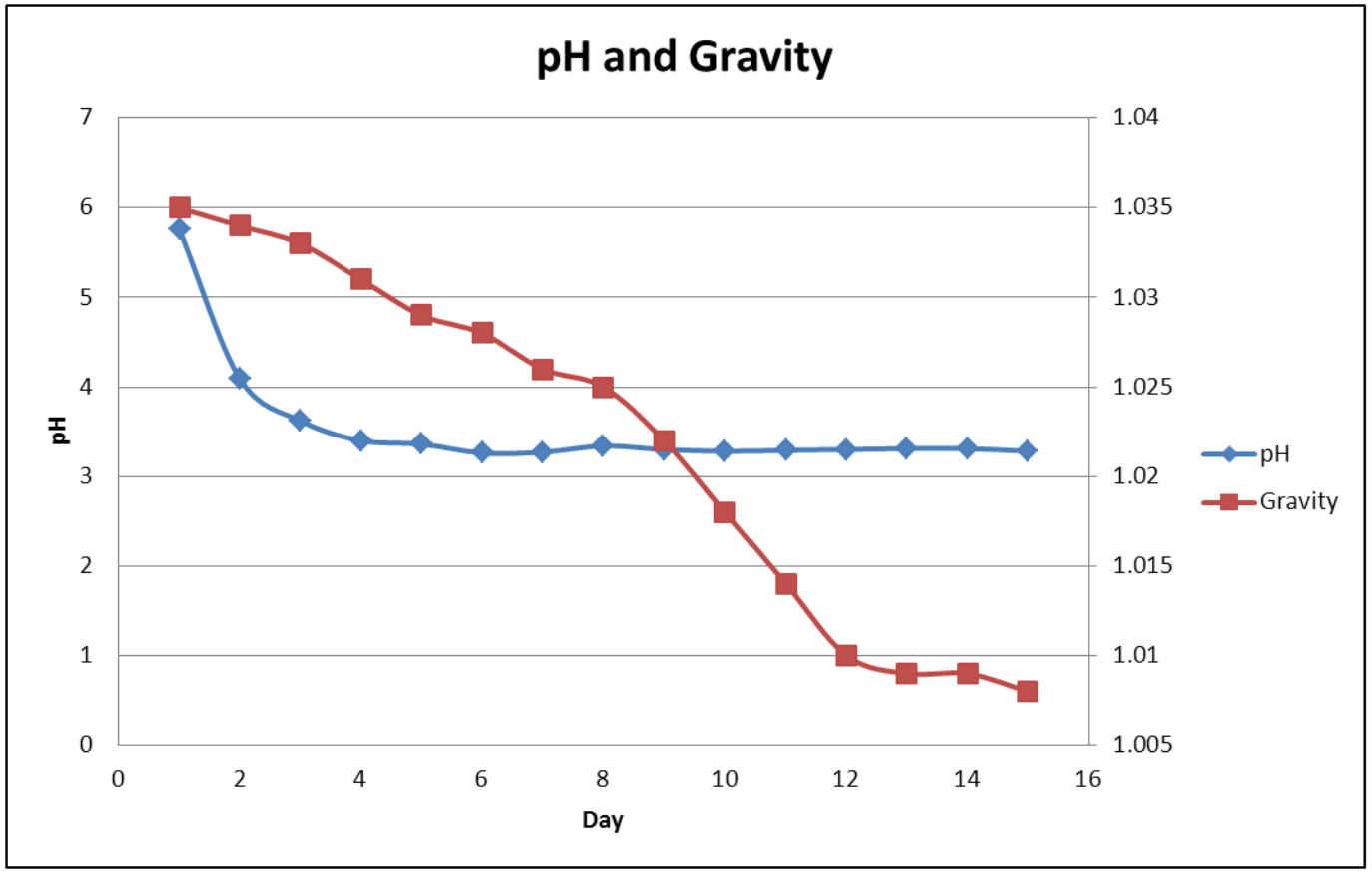
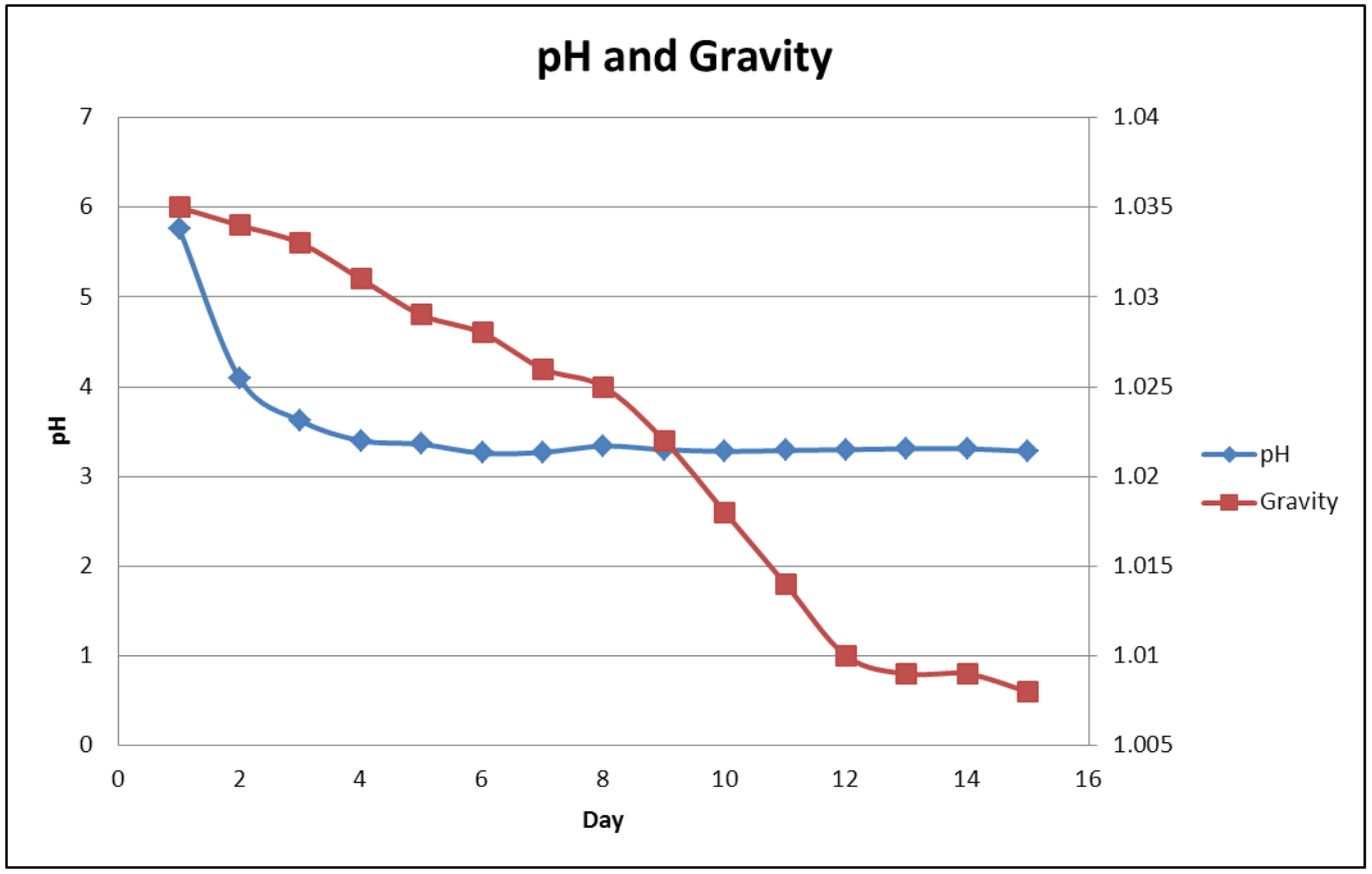
Solera Berliner brew

Day	pH	Grav.	Temp	
1	5.76	1.035	93	Pitched 10L 5335 L. buchneri
2	4.09	1.034	87	
3	3.62	1.033	84	
4	3.4	1.031	82	
5	3.36	1.029	80	
6	3.26	1.028	80	
7	3.27	1.026	79	Pitched 5L 2124 Bo. Lager
8	3.34	1.025	57	
9	3.3	1.022	55	
10	3.28	1.018	57	
11	3.29	1.014	57	
12	3.3	1.01	56	
13	3.31	1.009	56	
14	3.31	1.009	56	
15	3.28	1.008	57	

Solera Berliner brew



Solera Berliner brew



Solera Berliner brew

Beer Name	% Alcohol by Weight	spgr. Beer	Color SRM	pH	total acidity %lactic acid
5335 Only	0.48	1.02966	3.1	3.44	0.77
5335 then 2124	2.75	1.00750	2.7	3.09	0.89

Samples analyzed at 4 weeks after brew day

Natural Berliner brew

Natural Berliner brew

Natural Berliner brew

Natural Berliner brew

Questions?

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