



New Yeast for Non-alcoholic Beer: *Torulaspora delbrueckii*

SafBrew™ LA-02 vs SafBrew™ LA-01

Name
Title

Torulaspora delbrueckii: non saccharomyces

Maltose Negative Microorganism

SafBrew™ LA-02:

invertase active but is very slow and will only ferment simple sugar and **leave the complex sugar of the wort untouched** (maltose - maltotriose - dextrins)



Sugar
composition
in % w/w of
typical wort

Glucose

≈ 10-15%

Maltotriose

15-20%

Maltose

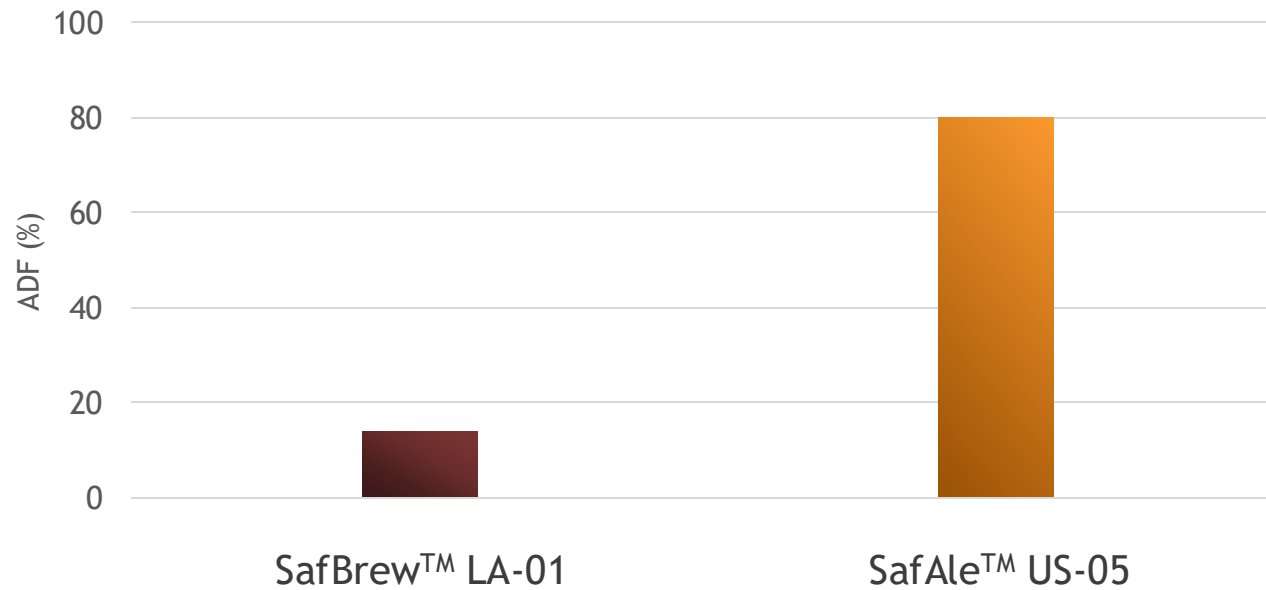
50-60%

Dextrins

15-20%

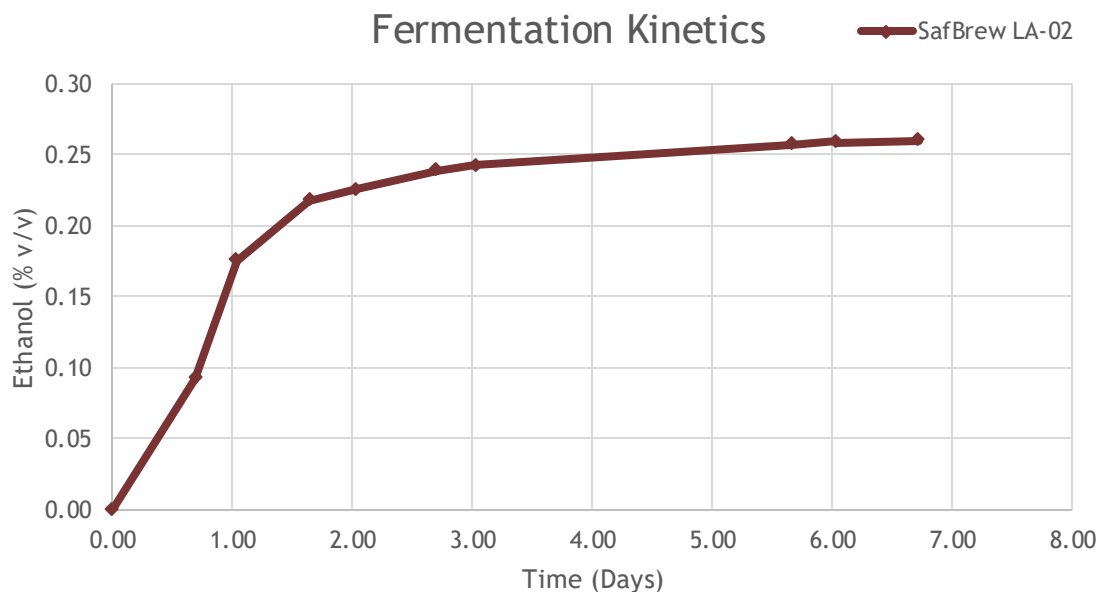
Expected Apparent Degree of Fermentation (ADF)

ADF of SafBrew™ LA-01 is only around **13-14%**



Expected Apparent Degree of Fermentation (ADF)

ADF of SafBrew™ LA-02 is **limited to 10%** depending on the wort composition

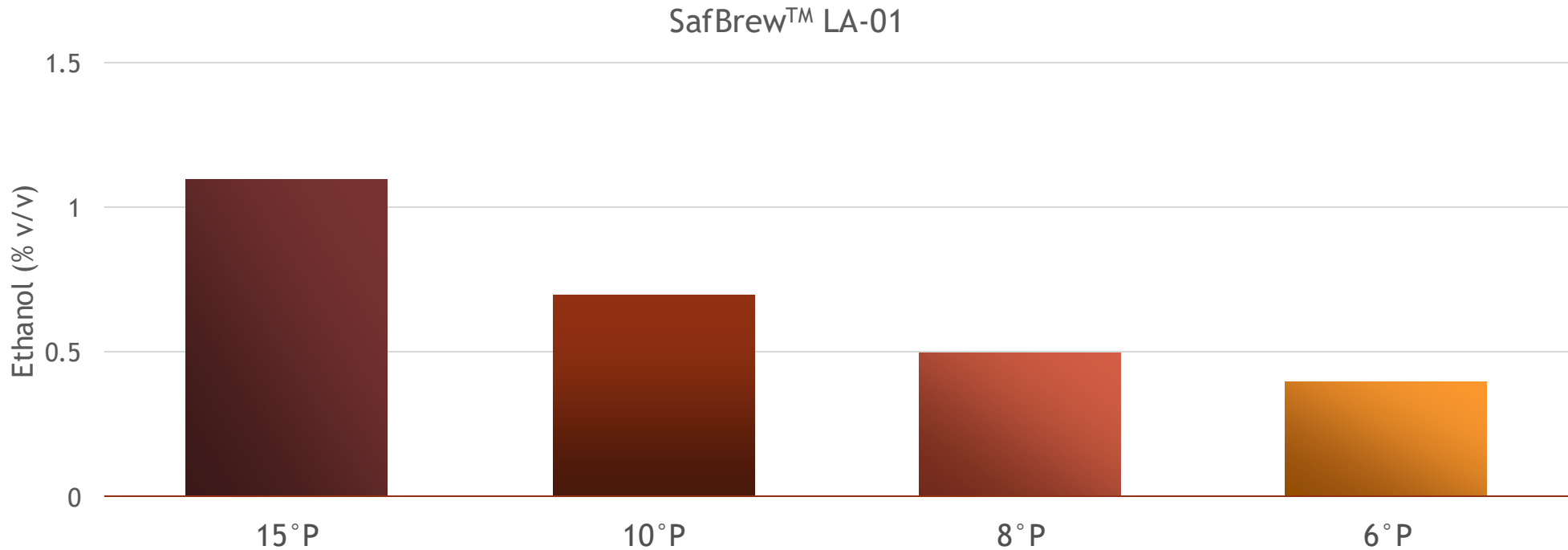


- **Wort at 8°P:** 100% pils malt
- **Mashing regime:** 65° C/30 min. + 74° C/20 min.
- **Bitterness:** 10ppm IAA
- **Fermentation:** in flask at 20° C/100rpm
- **Pitching rate:** 5 x 10⁶ cells/ml

Expected SafBrew™ LA-01

Ethanol production (ABV) - %/v/v

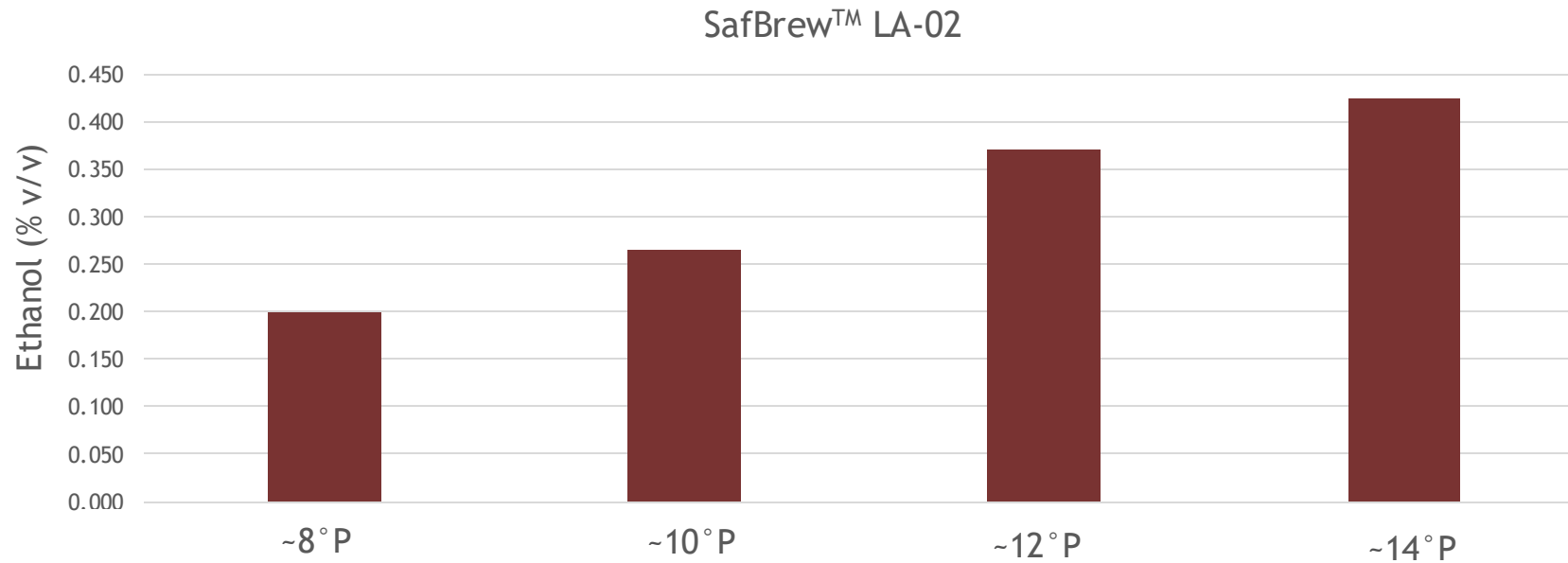
Below **0.5 % ABV** can be reached around **6 - 7 °P**



Expected - SafBrew™ LA-02

Ethanol production (ABV) - %/v/v

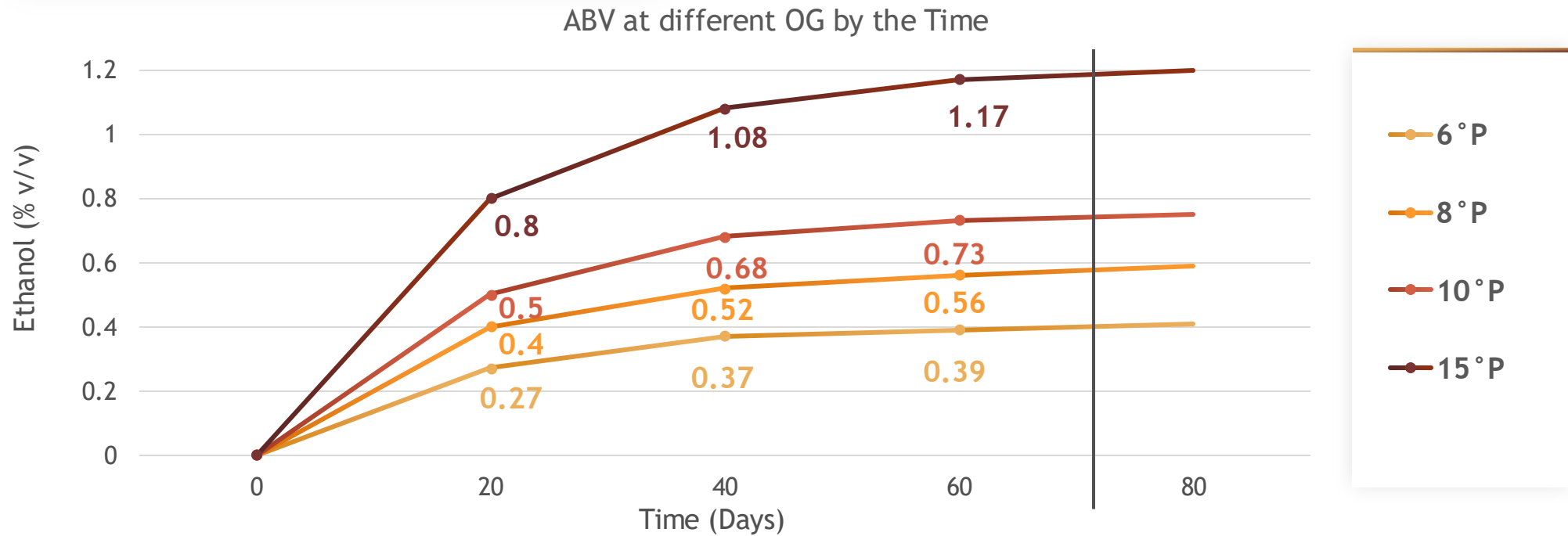
Around **0.2 % ABV** can be reached with a wort at **~8 °P**



Effect of gravity

Fermentation Kinetics: SafBrew™ LA-01

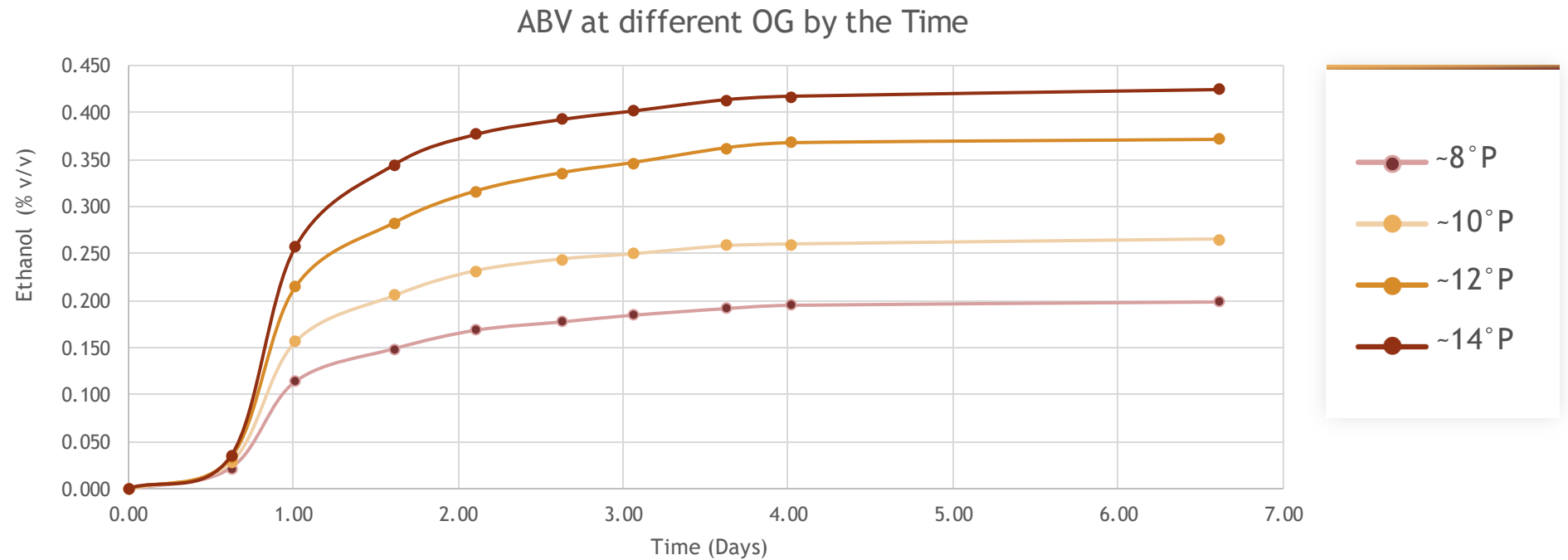
Limit reached after ~75 hrs



Effect of gravity

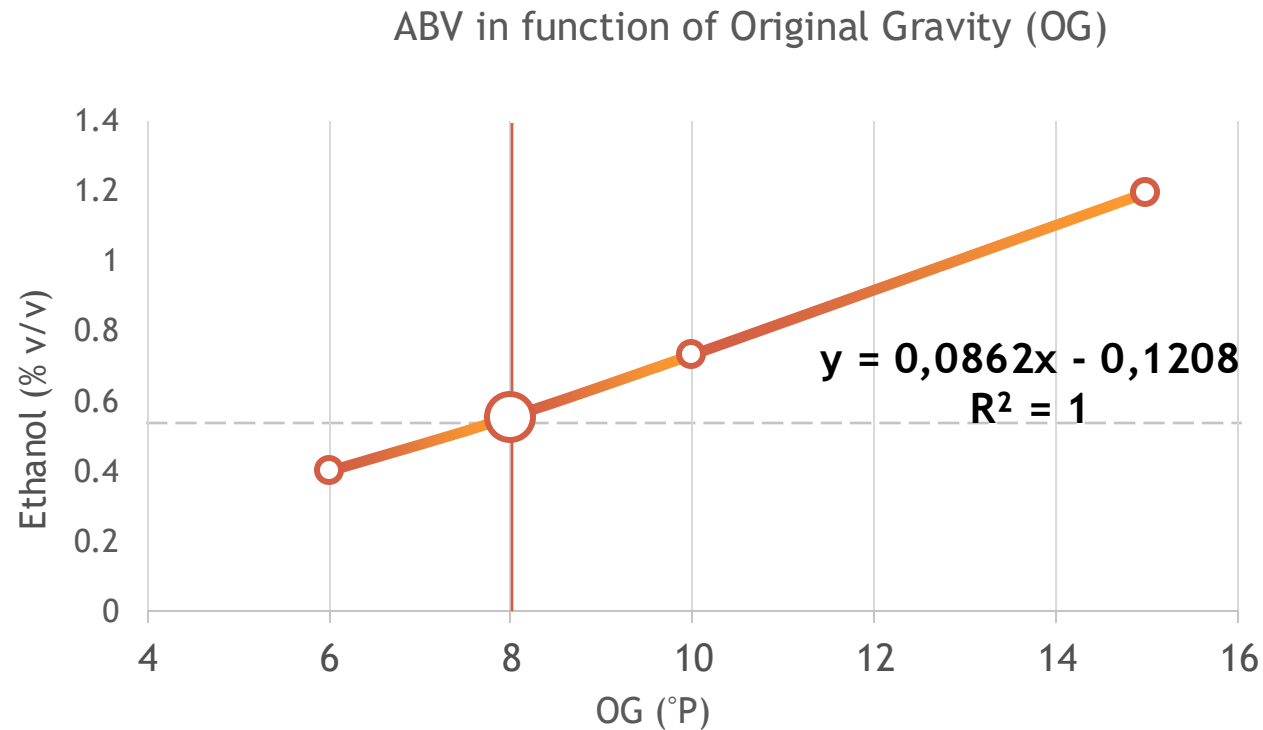
Fermentation Kinetics: SafBrew™ LA-02

Limit reached after +/-4 days



Effect of gravity

Ethanol production VS sugar consumption: SafBrew™ LA-01



Linear regression

between the ABV (%)
and the OG (°P)

0.5% ABV

is reached

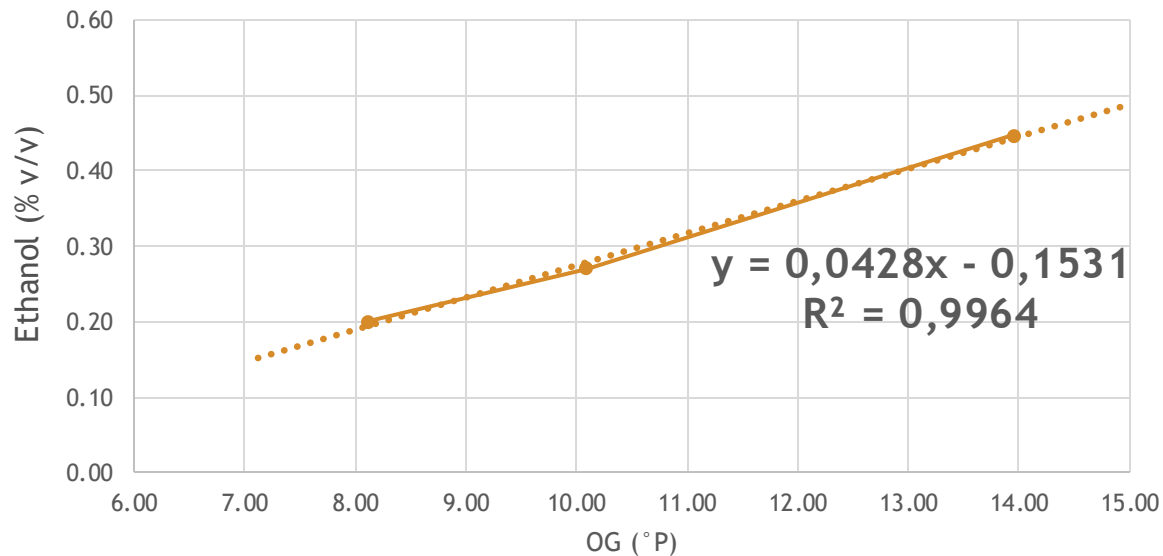
with a wort of about 7-8°P

Effect of gravity

Ethanol production: predictive model (8 - 14 °P): SafBrew™ LA-02

The exact value depends on **raw materials** and **mashing regime** resulting in the **quantity of simple sugars** available for the yeast.

ABV in function of Original Gravity (OG)

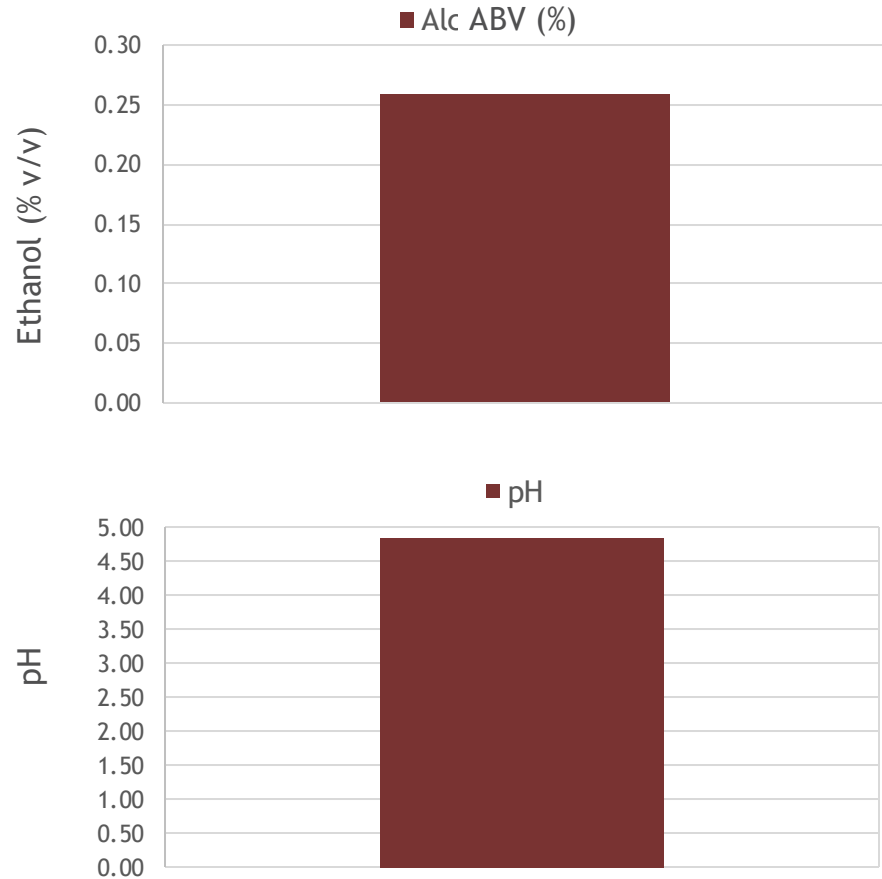


Original gravity	Expected alcohol content (low)	Expected alcohol content (high)
4 °P	0,09%	0,19%
6 °P	0,15%	0,30%
8 °P	0,20%	0,40%
10 °P	0,25%	0,51%
12 °P	0,31%	0,63%
14 °P	0,37%	0,75%

- Wort at 8-10-(12)-14° P: 100% pils malt
- In triplicates
- Mashing regime: 65° C/30 min. + 74° C/20 min.
- Bitterness: 10ppm IAA
- Fermentation: in flask at 20° C/100rpm
- Pitching rate: 5 10⁶ cells/ml

Natural pH - SafBrew™ LA-02

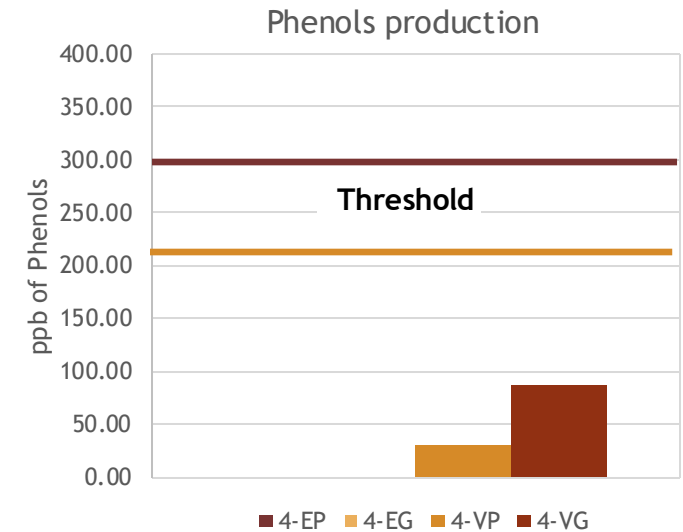
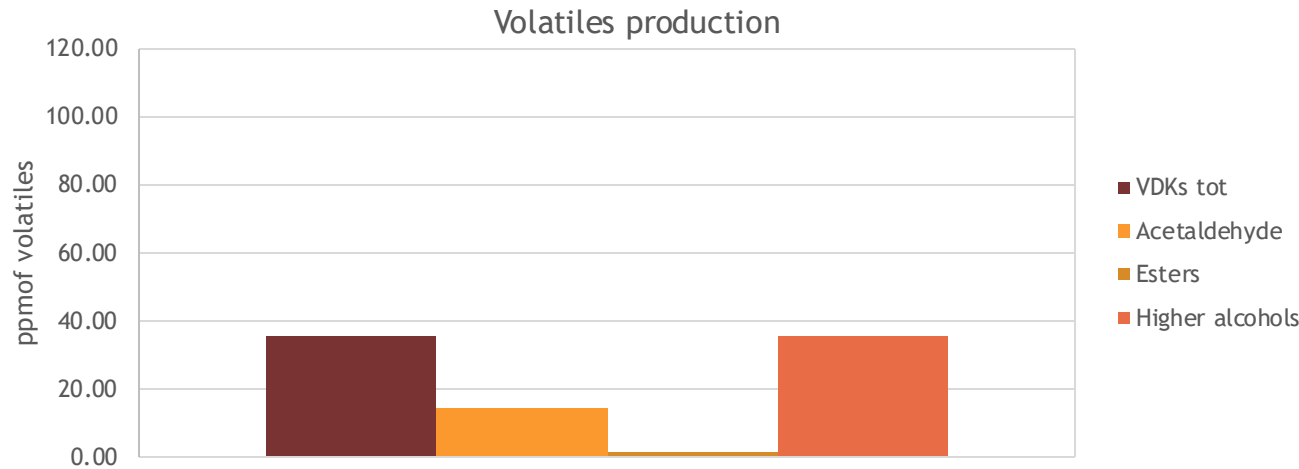
To be corrected to around 4,2 (microbial stability)



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- Mashing regime: 65° C/30 min. + 74° C/20 min.
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Volatile compounds - SafBrew™ LA-02

VDK-Acetaldehyde-Esters-Higher Alcohols-Phenols



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- In triplicates
- Mashing regime: 65° C/30 min. + 74° C/20 min.
- Bitterness: 10ppm IAA
- Fermentation: in flask at 20° C/100rpm
- Pitching rate: 5 x 10⁶ cells/ml



**Neutral Aroma
with no phenols**

Sensory Analysis

SafBrew™ LA-01 vs SafBrew™ LA-02

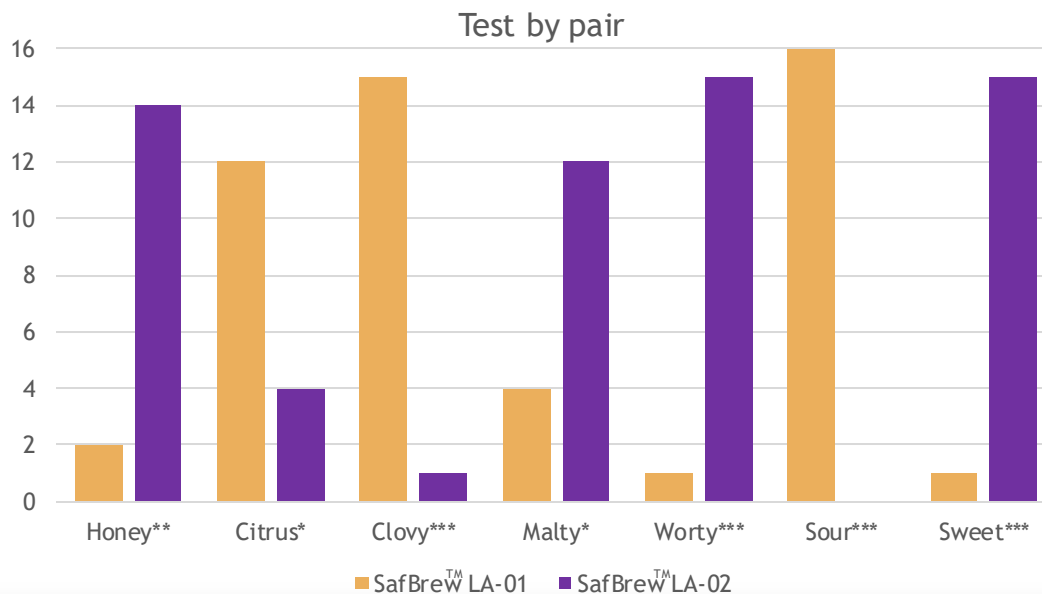
- Wort at 7-8° P: 100% pils malt
- Mashing regime: 65°C/30 min. + 74°C/20 min.
- Bitterness: 10ppm IAA
- Fermentation: in 1hl FV at 20°C
- Pitching rate: 5 10⁶ cells/ml

CONTEXT

The project aim to compare two yeasts (SafBrew™LA-01 and *Torulaspora* SafBrew™LA-02) on the same NOLO base

METHODOLOGY

Pair test - comparison of the two products according their intensity on several descriptors. Descriptors have been chosen by the panel, and one session was dedicated to train panelists on these descriptors



CONCLUSIONS

SafBrew™ LA-01 is considered as more clovy, more citrusy and more sour than SafBrew™ LA-02.

SafBrew™ LA-02 is considered as more honey, more malty, and sweeter than SafBrew™ LA-01.

What is pasteurization?

Two types of pasteurization:

- Tunnel
- Flash



1PU

= 1' at 60°C
(140°F)
equivalent

PU

= $t * 1.393^{(T-60)}$

t

=Time
in minutes

T

=Temperature
in °C (°F)

Trial description



Wort
fermentation with
SafBrew™ LA-02
at 25°C
(77°F)



Wort
centrifugation



Cross-contamination
with
SafAle™
T-58

0 cfu/ml (control)
10³ cfu/ml
10⁴ cfu/ml
10⁵ cfu/ml



Pasteurization
at 63 °C
(145.4°F)

time:
PU/1.393⁽⁶³⁻⁶⁰⁾

Sequence
with no latency

Contamination

Pasteurization
25 PU, 50 PU,
75 PU and 100 PU

Plating
with YPD media

$$\text{Pasteurization time} = \frac{\text{PU}}{1.393^{(63-60)}}$$

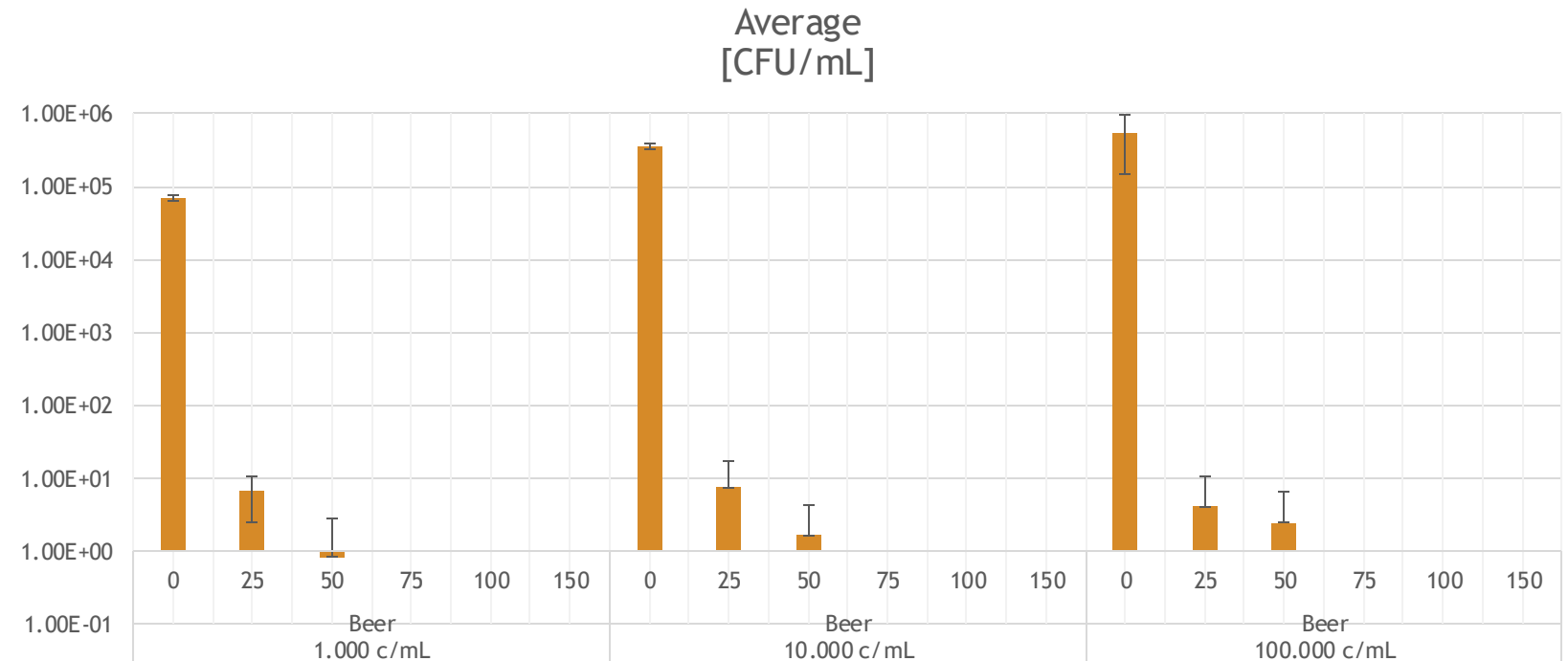
Alive yeast in the bottles: cross-contamination with SafAle™ T-58

Presence of alive yeast at 25 PU:

SafBrew™ LA-02 and/or SafAle™ T-58

Absence of yeast:
from after 50 PU

Mandatory:
Min over 50 PU



Recommendations

Usage of the Yeast

Pitch rate:

50-80 g/hl in primary fermentation (0.06 to 0.10 oz/gal).

Direct Pitching:

Pitch the yeast directly in the fermentation vessel on the surface of the wort. Progressively **sprinkle the dry yeast** on top of the wort ensuring the yeast covers the entire surface of the wort available to avoid clumps. Ideally, the yeast will be added during the first part of the filling of the vessel; when the wort is cooled at **fermentation temperature**.

Rehydration:

Alternatively, sprinkle the yeast in **minimum 10 times** its weight of sterile water or boiled and hopped wort at 15 to 30°C (59°F to 86°F). Leave to rest 15 to 30 minutes, gently stir and pitch the resultant cream into the fermentation vessel.



Recommendations

Usage of the Yeast



Aeration:

It is not necessary to aerate the wort prior to fermentation.

Temperature:

SafBrew™ LA-02 is recommended between 20°C and 25°C (68 - 77°F). For a quick fermentation we recommend the higher end of this range.

As soon as the final attenuation is reached, the beer should be cold crashed for maturation. Typical fermentation time is **around 3-4 days** (with a fermentation temperature of around 20°C). The beer must be kept cold until beer treatment and pasteurization. Diacetyl rest should **be avoided at high temperature**.

Dry Hopping is not recommended at fermentation T° or T° higher than 4-5°C to avoid hop creep effect, which will conduct to a higher concentration in glucose that will ferment in presence of yeast. It is highly recommended **to dry hop only after the beer is cold crashed**.

Recommendations

Points of Attention

For ADF:

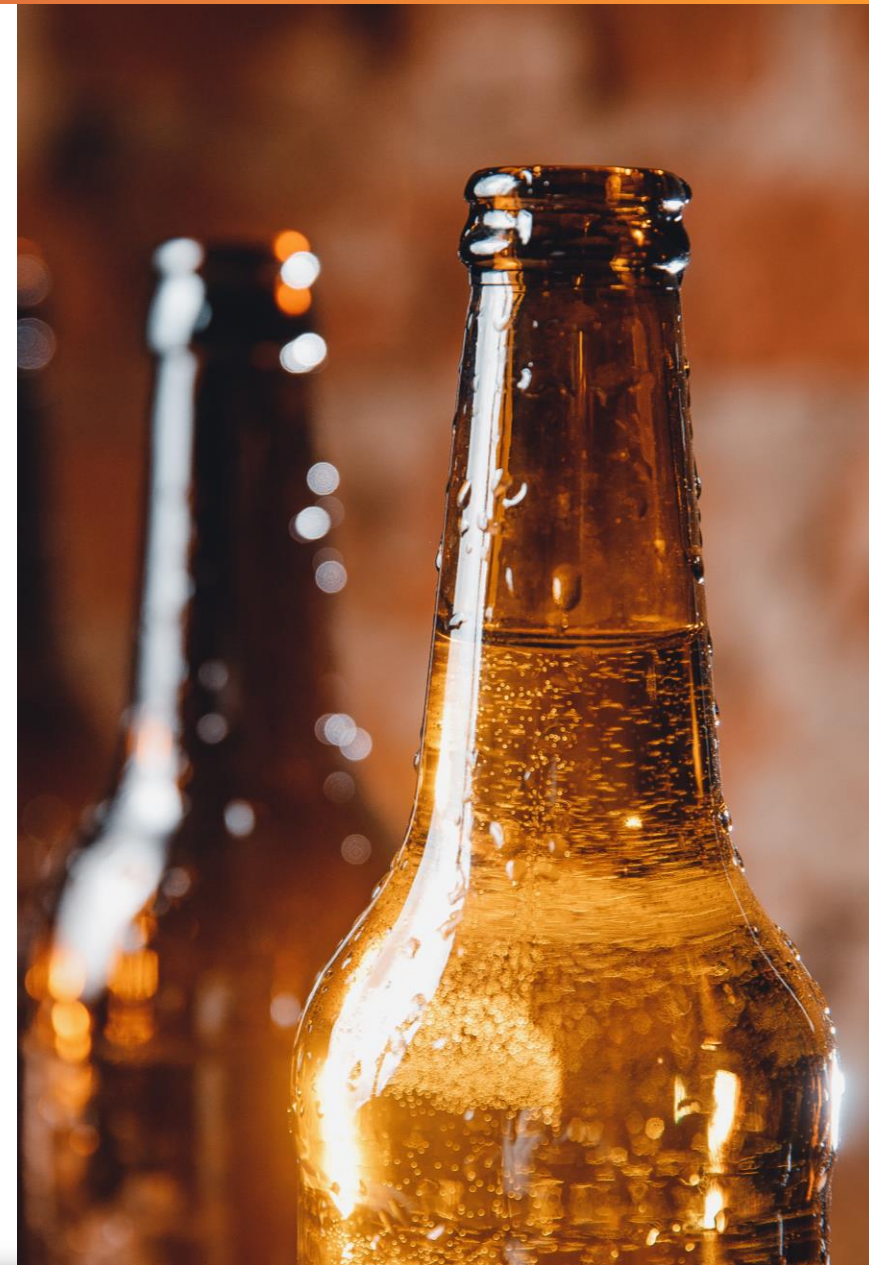
The expected final attenuation is **limited to an ADF of max.10%**. It is strongly recommended to cold crash as soon as your ADF is in this range. Any cross-contaminant could otherwise take over and ferment the remaining sugars.

For beer packaging :

Due to residual sugars left in the beer, **pasteurization of the packaged beer is mandatory** to avoid living microorganisms remaining in the product. At pH 4.2, we recommended a minimum of 50 PU (ideally 80 to 120 PU). At lower pH level and/or high IBU, the PU level can be adapted. Flash pasteurization is not satisfactory for stabilizing the beer, due to a possible presence of living microorganisms in later process steps.

For pH:

Due to the low attenuation of **SafBrew™ LA-02**, the acidification or pH drop will be **less than typical fermentations** (between pH 4.5 and 5). It is recommended to adjust the pH before and/or after fermentation to achieve **flavour and microbial stability**.



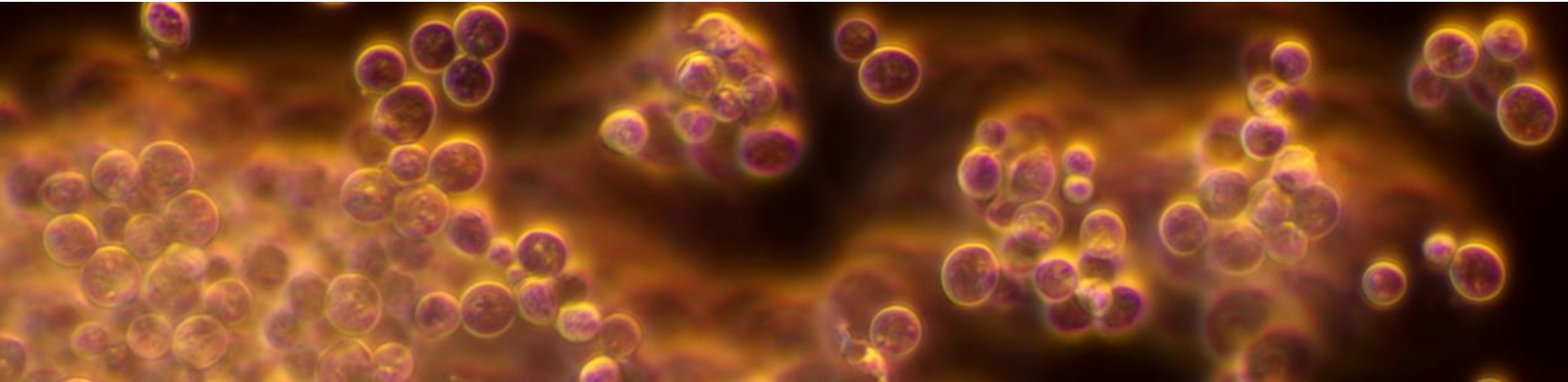
Recommendations

Points of Attention

This yeast is not suitable for cropping and repitching.

Any *S. cerevisiae* or *S. pastorianus* (cross-contaminant from the brewery) that would enter the slurry would have a growing advantage over the *Torulaspora delbrueckii* as the latter cannot ferment maltose.

Similarly, **SafBrew™ LA-02 should not be used for propagation** as any contaminant (even *S. cerevisiae* or *S. pastorianus*) would have access to the maltose/maltotriose and dominate the propagation media.



No & low-alcohol beer with SafBrew™ LA-02

Conclusions



Pitching rate
50g/hl



Fermentation
15-25°C
(59-77°F)
Ideally 20-25°C



Apparent degree
of fermentation
<10%*



Alcohol produced
0.2 ABV**
for 8°P



Off-flavors
None



Pasteurization
50-100 PU



Repitching
None



Refermentation
None

*Traditional brewing diagram / **pH is around 4.5

SafBrew™ LA-02 characteristics

Total esters
Low

Total superior alcohols
Low

Apparent attenuation
5-10%

Flocculation
-

Sedimentation
Medium





Product details	
Ingredients	Yeast (<i>Torulaspora delbrueckii</i>), emulsifier : sorbitan monostearate (E/INS 491)
Tagline	The ideal POF negative yeast for delicate low and no-alcohol beers
Usage	Recommended dosage : 50 to 80 g/hL Recommended temperature range : 20-25°C
Description	SafBrew™ LA-02 (<i>Torulaspora delbrueckii</i>) is the first Fermentis selected non-<i>Saccharomyces</i> yeast specifically for the production of no & low-alcoholic beers (<0.5% ABV). This yeast primarily assimilates simple sugars (glucose and fructose), and gradually assimilates saccharose. This yeast strain does not assimilate maltose, maltotriose or dextrins. Post fermentation, this strain exhibits neutral to mild fermentation characteristics with no phenolic (spicy) notes. Sensory profiles may differ depending on the wort composition and fermentation conditions.
Packaging	Available in 1 x 10kg ; 4 x 2,5kg ; 20 x 500g Made in Belgium <u>Shelf life</u> : 2 years <u>Storage conditions</u> : < 10°C for less than 6 months < 4°C for longer term storage

Experimental conditions: standard wort in EBC tube at 8°P and 13,5°P at 20°C/68°F



**Thank you for
your attention!**



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