



# Non-Sacchs in Fermented Beverages

Sofie Saerens

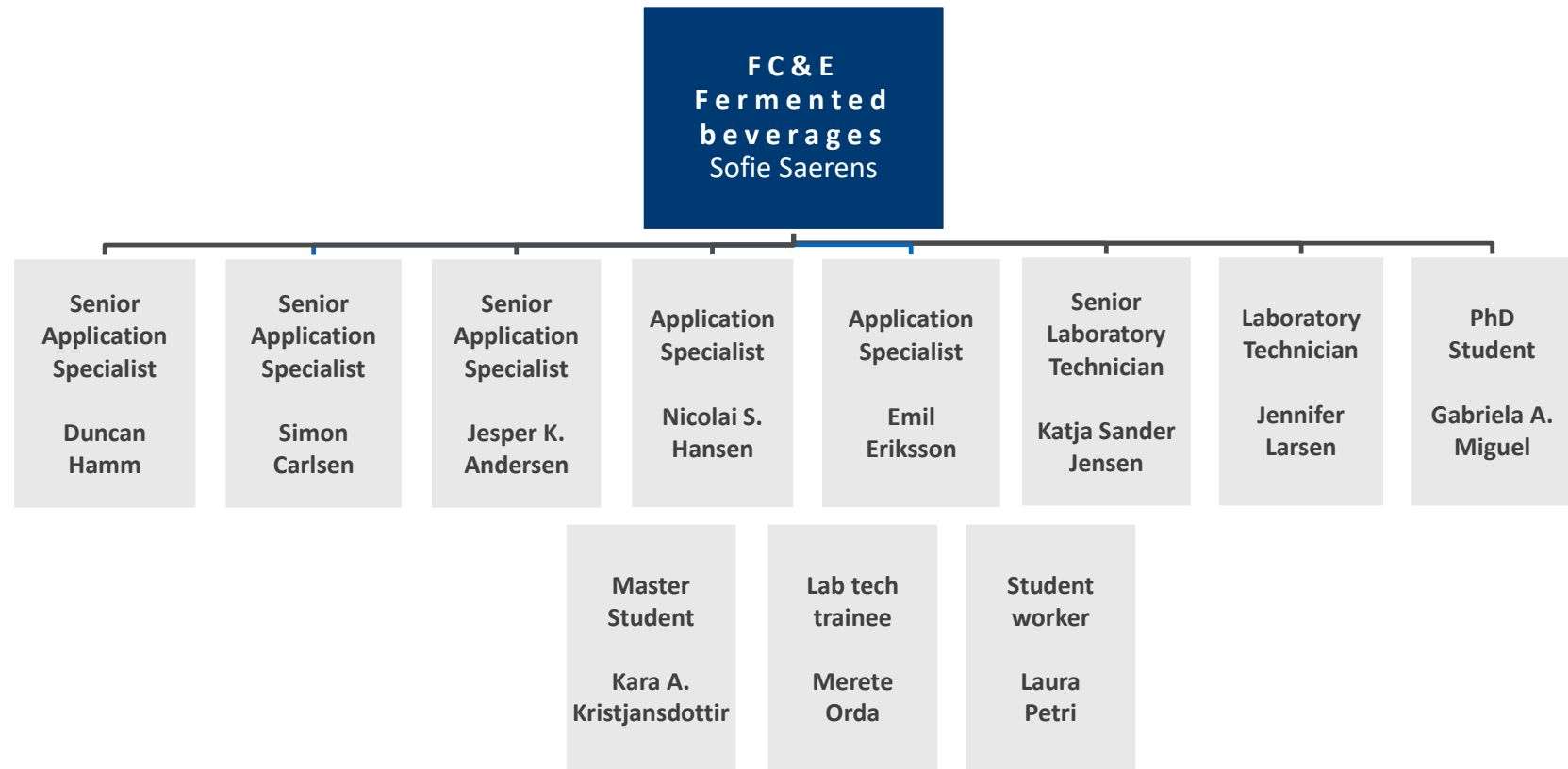
13-01-2022

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# Organization



# Fermented beverages – Fruit based fermentations

End product achievement



## WINE

- > Robust fermentations
- > **Premiumization**
- > **BioP, reduction of sulfites**
- > Options for **Non-alcoholic wines**



## CIDER

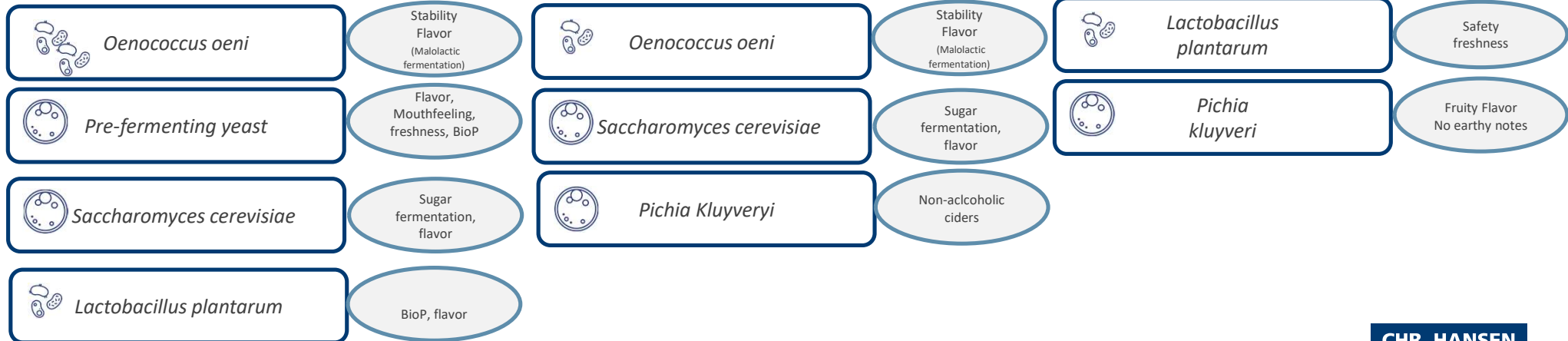
- > Robust fermentations
- > Refine sensory signature of **branded ciders**
- > Process devoted to **Non-alcoholic fermented ciders**



## VEGETABLE & FRUIT

- > BioP (no cross contaminations)
- > **Tweak flavor**
- > **Impact sugar content**
- > Remove earthy flavor notes
- > Avoid Food waste

Fermentation systems



# Fermented beverages – Cereal, sugar & water-based fermentations

End product achievement



**Non Alc. beer**

- > True fermentation solution
- > Full flavor & no alcohol
- > Sustainable
- > Innovative



**Alcoholic beer**

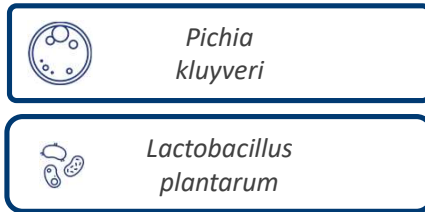
- > Process optimization
- > Consistent brew
- > Clean flavour



**Fermented tea and botanicals**

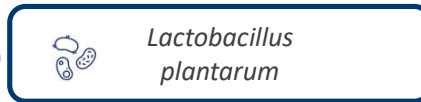
- > One step fermentation with-out alcohol
- > Full flavor & no alcohol
- > New World Alternatives

Fermentation system

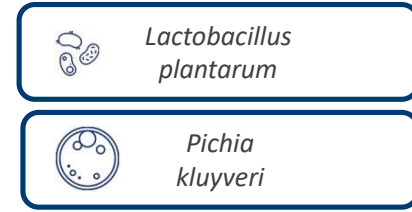


Complex flavor

Clean crisp acidity



Clean crisp acidity



Clean crisp acidity

Complex fruity flavor

Stay tuned for more to come in FY22



# SmartBev™ NEER®

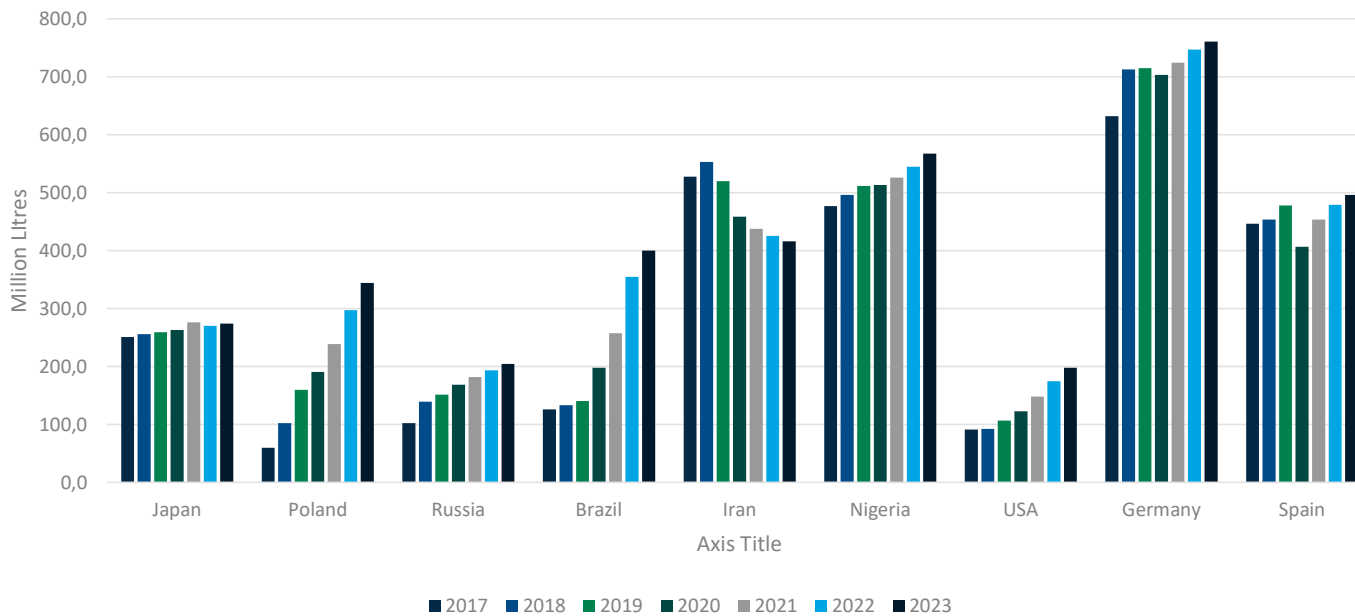
Fast, sustainable and cost-efficient solution for full  
flavor beer with no alcohol

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# The Largest NAB/AFB Markets Continue to Grow

## LARGEST ALC. FREE MARKETS IN VOLUMES



### MARKET STATUS

Japan, Germany and Spain are well established markets in regards too alcohol free beer and still in growth.

Markets with significant growth potential are Poland, Russia, Brazil, Nigeria and USA

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## Heard the news? Non-alcoholic beer is actually good now...

The overall quality of Non-alcohol beer (NAB) and alcohol-free beer (AFB) has been drastically been increasing in the last 2 years<sup>1</sup>

Increasing the overall acceptance and awareness, which is needed for the whole category. However, this all demands a certain standard going forward to succeed in the NAB and AFB market

1: [Sour, IPA, Stout and More: 16 New Australian Non-Alcoholic Beers to Try \(broadsheet.com.au\)](https://broadsheet.com.au)

# Yeast fermentation is at the heart of great beer

Managing yeast to ensure certain outcomes was discovered in the late 19<sup>th</sup> century and has been utilized by the industry ever since

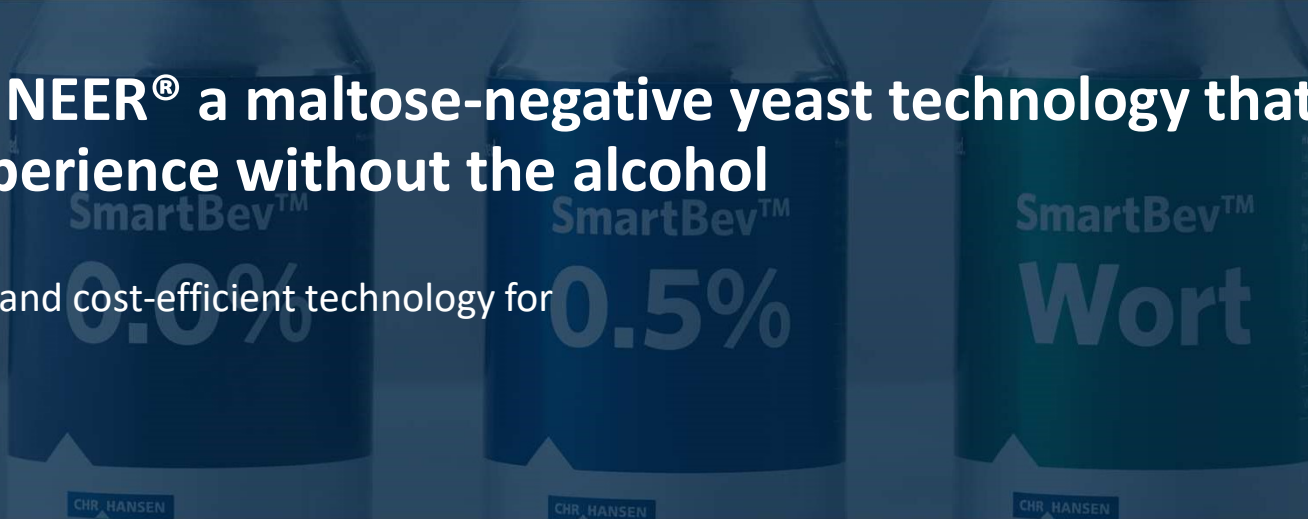
We believe the same counts for alcohol-free beer (AFB/NAB/LAB)





# SmartBev™ NEER® a maltose-negative yeast technology that creates the full beer experience without the alcohol

A fast, sustainable and cost-efficient technology for alcohol-free beer



## THE FULL SENSORY IMPACT WITH NEER®

Fermentation with NEER® removes wort flavors, optimizes beer flavor and yields a well-integrated body and mouthfeel



## FAST ROUTE TO PRODUCT WITH NEER®

NEER® is a real brewing solution requiring limited CAPEX investment giving the opportunity of a head start and flexibility in emerging AFB markets



## SUSTAINABLE BUSINESS WITH NEER®

NEER® is a cost efficient and sustainable process for alcohol-free beer production. With significant savings on raw materials<sup>1</sup>



## EFFICIENT PRODUCTION WITH NEER®

Short production time of 2-6 days of fermentation and no need for maturation as well as

1: By lowering the initial Plato of the wort you are saving 40-65% on the malt (more details on Slide :???)

## The definition of beer

An alcoholic drink made from yeast-fermented malt flavored with hops<sup>1</sup>

- The basics of brewing is water + malt + hops and yeast to ferment.
- Why change this when going into alcohol-free beer?



### NEER® A REAL BREWING SOLUTION

With these basics amazing beers have been crafted. The NEER® offers a solution to keep crafting based on the basics and the true brewing tradition

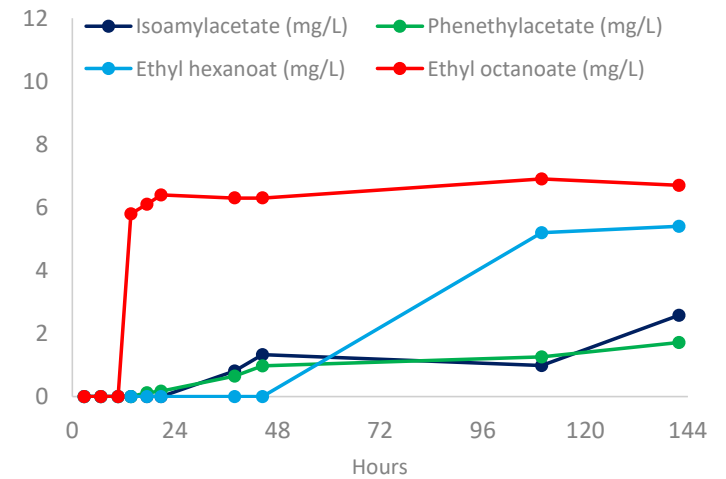
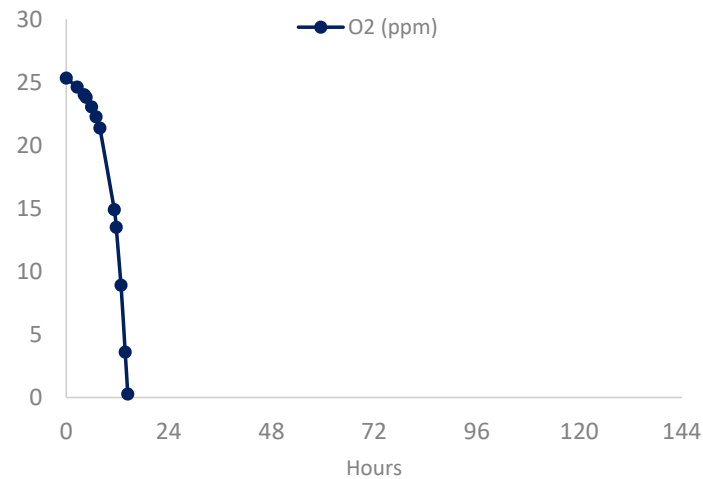
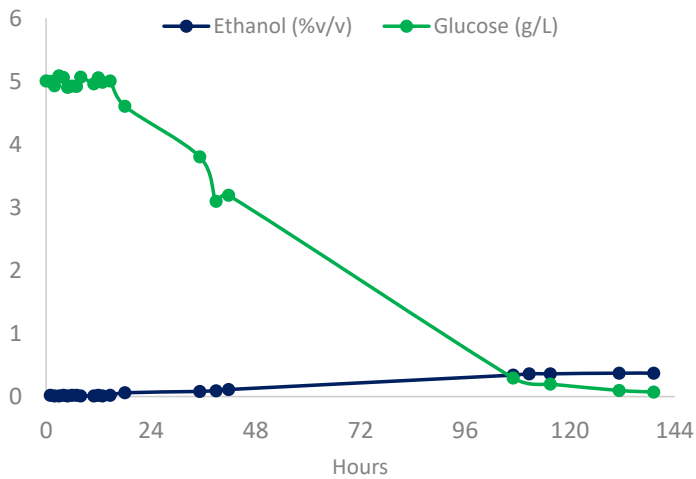
A good beer (with or with-out) alcohol needs to be balanced, refreshing and an adult experience

1: Google "what is beer"



# Fermentation characteristics <0.5 % ABV

## Data from brewery



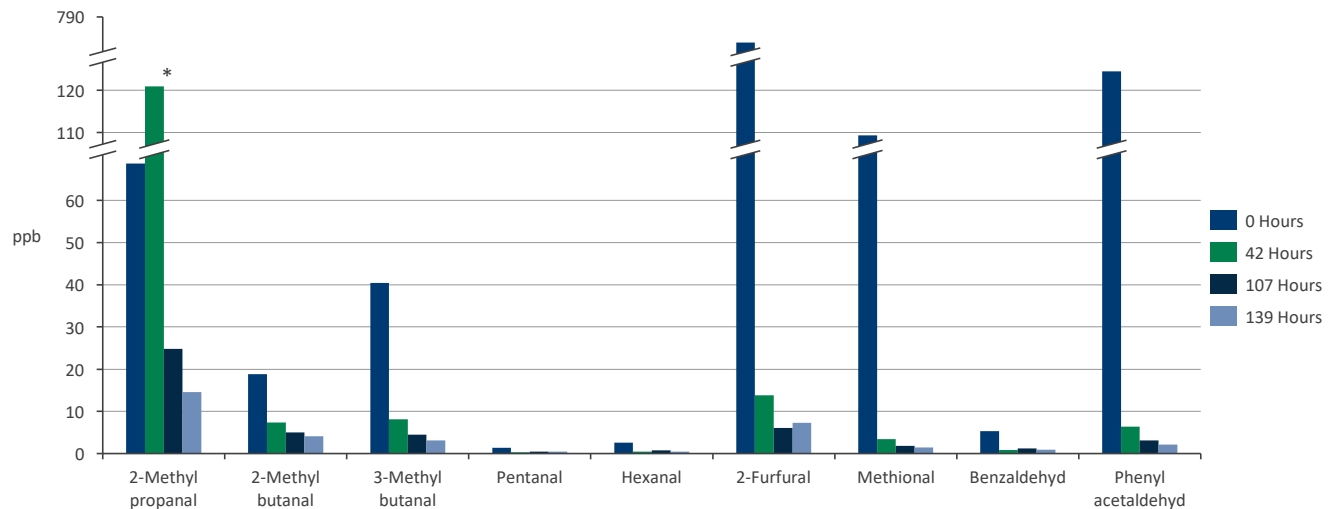
Volume: 80 hl  
 Fermentation temperature: 18 °C  
 Starting extract: 6 °P



## Removal of wort flavor

Within the first 42 hours of fermentation with NEER<sup>®</sup>, most aldehyde compounds are reduced significantly. With a longer fermentation time, the level of aldehydes decreases even further.

### REDUCTION OF ALDEHYDE COMPOUNDS OVER TIME WITH NEER<sup>®</sup>



Data from a full scale NAB IPA beer brewed with NEER<sup>®</sup>

\*2-Methylpropanal at 42 hours seems to be an outlier, as we see a clear reduction at 107 and 139 hours

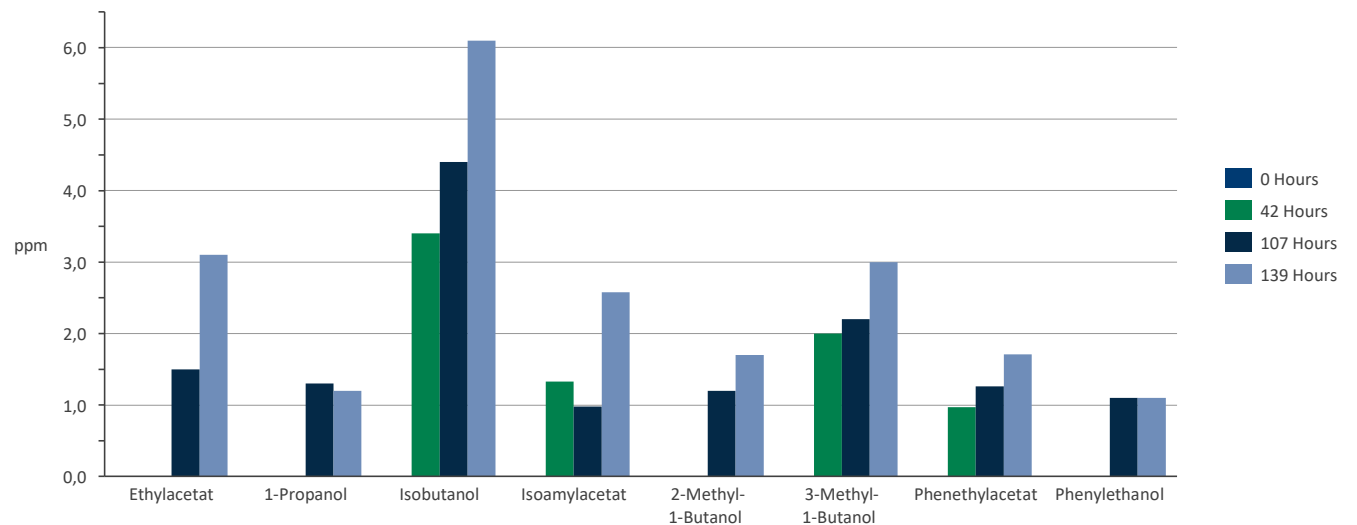


## Beer flavors originating from fermentation

Esters and higher alcohols are some of the main fermentation flavors in beer, making beer taste and smell like beer.

NEER® will produce these different fermentation flavors depending on the application, but it will always yield a good balance between iso-amylacetat and ethylacetate<sup>1</sup> and contribute with pleasant overall flavor.

### ESTERS AND HIGHER ALCOHOLS WITH NEER®



Data from a full scale NAB IPA beer brewed with NEER®

\* Wit-in reasonable fermentation time , we never recommend > 6 days fermentation

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## <0.5 % ABV with SmartBev™ NEER®

NEER® is a yeast to help you brew your perfect NAB. Making it your beer with your unique recipe. To get the most out your NEER® brew there are some guidelines and requirements.



### PROCESS TO PRODUCE < 0.5% BEER WITH NEER®

PLATO	Aim for 4-8 Plato wort, with max. 10g/L monosaccharides.
ADDITIONS	Tannic acid (Brewtan B) should be added at mashing-in and end-of-boil.
DOSAGE	Apply dosage according to the recommendations on the pouch.
PH	SmartBev™ NEER® decreases pH only by 0.1-0.4 on average - pH adjustments are required.
OXYGENATION	Oxygenate as you would with your regular beer.
FERMENTATION	16 - 22 °C / 61 – 71 °F (18 °C / 65 °F is recommended for the first trial).
MIXING OF FERMENTATION	SmartBev™ NEER® is not a vigorous fermenter. Content of tank should be mixed throughout the fermentation.
FERMENTATION TIME	Until monosaccharides are completely consumed, or 0.4 % ethanol is reached (Approximately 3-5 days)
COOLING	Cool fermentation tank as usual and remember that the freezing point is close to 0°C
MATURATION	Short maturation for colloidal stability. Diacetyl production is neglectable.
CENTRIFUGATION	Recommended as yeast does not flocculate. Alternatively, filtration is an option.
PASTEURIZATION	As the beer contains residual sugar (maltose), we strongly recommend pasteurizing the beer after filling.



## Brewing <0.05% ABV Beer with NEER® utilizes that the *Pichia kluyveri* is Crabtree Negative

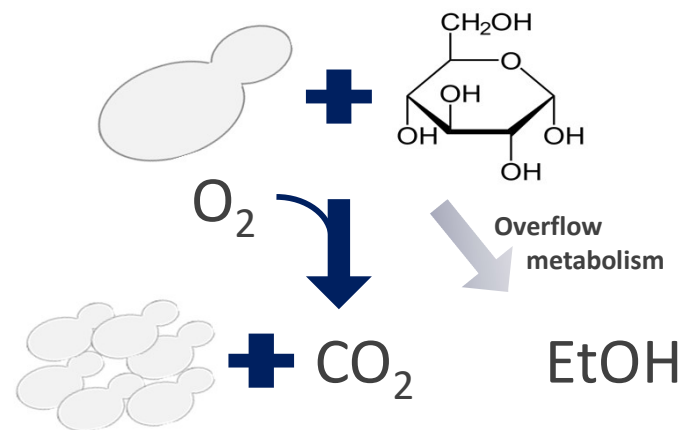
Traditional *Saccharomyces* spp. Brewing yeast are Crabtree positive and will even when oxygen is present produce ethanol. However, NEER® is Crabtree negative and cannot produce ethanol when oxygen is present.

By adding oxygen in a controlled manor NEER® will not produce ethanol, but still have remove wort charatcters, produce beer flavors and create mouthfeel.

### CRABTREE METABOLISM IN YEAST

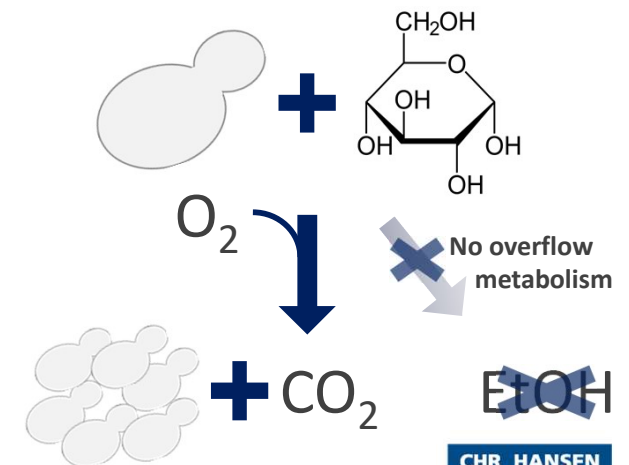
#### Crabtree positive yeast

(E.g. *Saccharomyces cerevisiae*)



#### Crabtree negative yeast

(E.g. *Pichia kluyveri*)



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## <0.05 % ABV with SmartBev™ NEER®

NEER® a yeast solution for brewing AFB. To obtain the best brew we have some guidelines for the brewing process for AFB with NEER®.



### PROCESS TO PRODUCE < 0.05% BEER WITH NEER®

PLATO	Aim for 4-8 Plato wort, with max. 10g/L monosaccharides.
ADDITIONS	Tannic acid (Brewtan B) should be added at mashing-in and end-of-boil.
DOSAGE	Apply dosage according to the recommendations on the pouch.
PH	SmartBev™ NEER® decreases pH like in a normal beer fermentation – follow the pH in the first trial to know if adjustment is needed in next trial.
OXYGENATION	Keep oxygen level above 2 ppm throughout the fermentation time
FERMENTATION	14 – 18 °C / 57-64°F (16 °C / 61 °F is recommended for the first trial).
MIXING OF FERMENTATION	Content of tank should be mixed throughout the fermentation to keep the yeast and the oxygen distributed homogenously in the fermentation tank.
FERMENTATION TIME	Until wort flavor is removed, and an acceptable level of esters has been produced. Expect 25 – 40 hours of fermentation depending on target level of esters. Remember to account for cooling time.
STOPPING THE FERMENTATION	The yeast will be able to ferment even at very low temperatures, cool to <5 °C, as fast as possible and remove yeast by centrifugation / filtration within 1-2 days.
MATURATION	No maturation is needed, but if performing one for colloidal stability make sure the yeast has been removed and the beer is kept cold.
PASTEURIZATION	As the beer contains residual sugar (maltose), we strongly recommend pasteurizing the beer after filling.



# SmartBev™ NEER® is a direct pitching yeast solution

- **One pouch contains enough yeast for 500hL or 50hL beer (depending the pack size) directly pitched in the fermentation tank**
- **The pouch is directly pitched into the brew tank**
- The NEER® products have a long shelf of 18 months at  $< -45^{\circ}\text{C}^1$
- The shelf-life enable a on site stock aiding for a more flexible planning of production of AFB/NAB.
- The Frozen liquid format that NEER® range is designed to help the brewing industry have an agile and safe process for non alc. yeast
- Our quality standards ensure high CFU, high activity and purity

<sup>1</sup> Chr. Hansen can assist in getting an appropriate freezer and we manage all the logistics

## KEY FACTS

- We ensure a high consistency and purity of the product in every pouch
- Ready to use in  $< 90$  min (from freezer to fermenter)
- The cells are frozen in an active state and requiring no activation

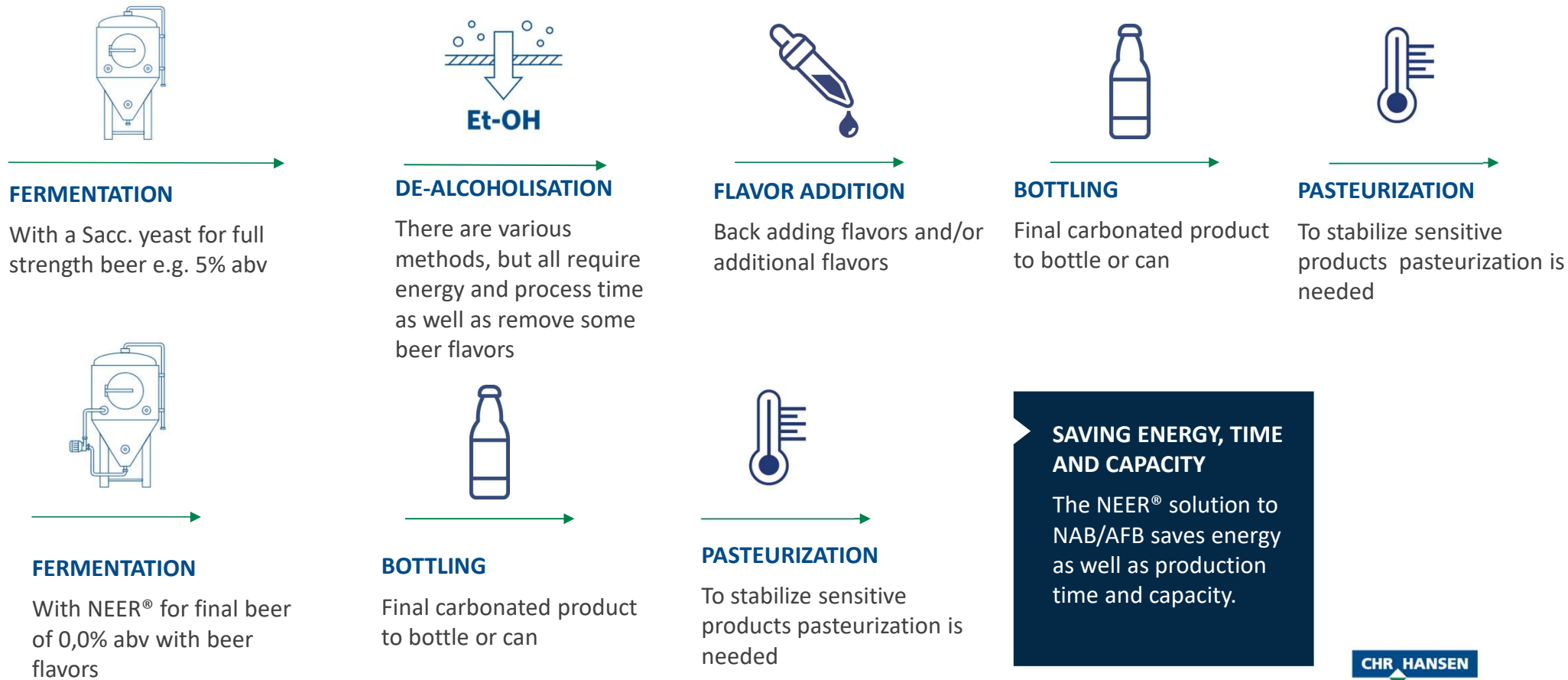


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# Alcohol free beer product – today and tomorrow?

Comparing “tradition” approach to AFB/NAB using de-alcoholization of full-strength beer to the NEER® solution



# Alcohol free beer product – today and tomorrow?

The NEER solution also enables a substantial saving on raw material, which will positively impact the cost of production as well as carbon footprint



## TRADITIONAL APPROACH USING A DE-ALC. PROCESS

Brewing a full-strength beer of 5% ABV requires around 11,4 plato wort



## BREWING 0,0% ABV WITH NEER®

You only use the malt needed for the final beer. We recommend around 4-8 plato wort

## SAVING 25-65% ON RAW MATERIAL

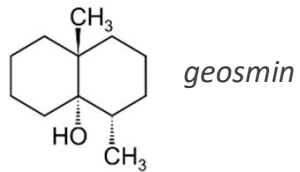
The NEER® solution for NAB/AFB gives significant impact on raw material consumption, which together with the saving on energy and production time results in a measurable more sustainable process for producing AFB/NAB, as well as keeping production cost low



## Fermented Vegetable Concept

# Case study: Improve flavour in beetroot juice

- › Beetroot has a high content of proteins, minerals and vitamins
- › Its pigments have health benefits
- › Fermentable carbohydrates consist mainly of sucrose (> 95%), and small amounts of pentose, glucose and fructose
- › Like other vegetables, the pH is high (6.1 – 6.3) and have low acidity
- › Challenge → characteristic earthy odour from *geosmin*

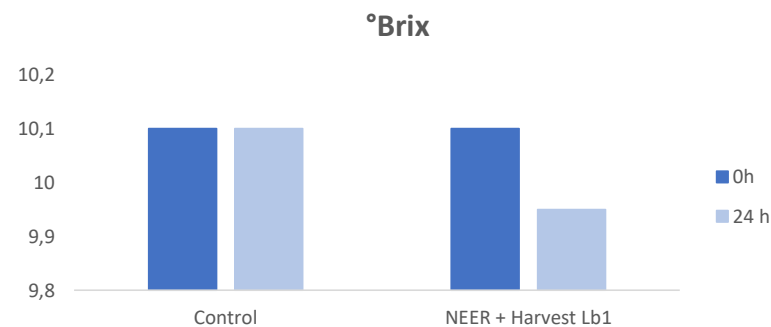
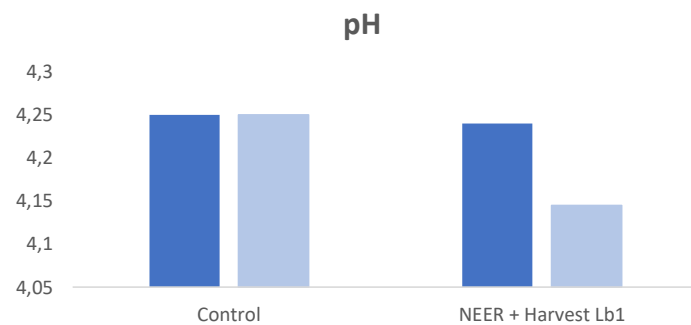


- › Why fermentation?
  - › Remove or mask negative off-flavours from vegetable juice
  - › Make vegetables juices more refreshing to drink
  - › Improve color and vibrancy



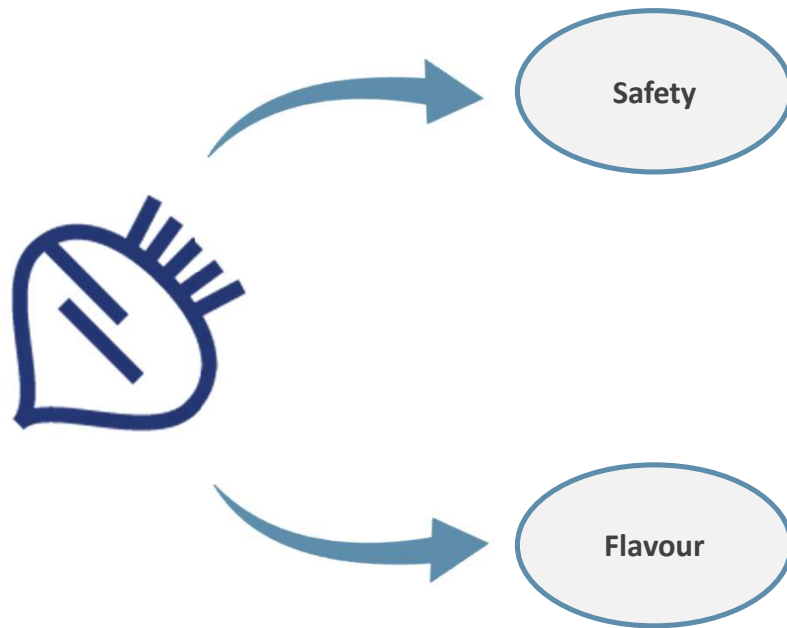
# Case study: Improve Flavor in Beetroot Juices

- Commercial organic pure beet juice + 1% lemon juice
- Temperature: 20°C
- Duration: 24 h
- Pasteurization (72°C for 5 minutes) after bottling
- 2 months shelf-life



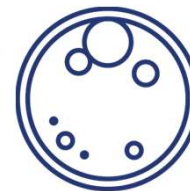
\* Sensory tasting done with 12 panellists

# Case study: Improve flavour and safety in beetroot juice



*Lactobacillus plantarum*  
e.g. Harvest LB-1™

- Harvest LB-1 contributes to **freshness** and **stability**:
  - Rapid acidification
  - Bio-protective properties (pH < 4.5)
  - Sensorial attributes: “sour”, “yoghurt”, “buttery”, “acetic” and “rhubarb” aroma



*Pichia kluyveri*  
e.g. NEER™

- **NEER™** contributes to the flavour profile:
  - “Fruity”, “banana”, “cherry”
  - Masks earth-like off-flavour

A photograph of four glasses of beer on a dark, textured surface. From left to right: a dark stout, a dark beer, a golden beer, and a light beer with a sprig of greenery. A dark blue semi-transparent overlay covers the left two glasses, with the text 'Thank you!' in white. The background is blurred, showing a white teapot, green herbs, and beer bottles.

Thank you!