



Beyond Beer Fermentations

**An Overview of Considerations for Alternative
Beverage Fermentations**



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From CBC 2023 State of the Industry

- Bart Watson

- Non-beer made up ~2% of respondents beer volume
- Non-beer products grew 19% YoY

It is believed that “within 5 years, up to 1/3 of products will not be traditional beer but products including wine, liquor, and non-alcoholic beverages.”

Some stats

Now more than ever

It becomes more important now to understand alternative beverages and considerations for yeast and fermentation to make these products great and creative

Why? To generate business growth

Beyond Traditional Beer

Non-Alcohol/Low Alcohol
Hard Seltzer
Hard Kombucha
Mead
Cider
Sake
Spirits

What Else?

Common Organisms:

Saccharomyces cerevisiae

Saccharomyces bayanus

Saccharomyces ludwigii

Torulaspora delbrueckii

Aspergillus oryzae

Brettanomyces bruxellensis

Acetobacter sp.

Zygosaccharomyces sp.

Lactobacillus sp.

Pediococcus sp.

And More!

TTB/FDA Considerations

Each Product Requires Regulatory Research/Considerations

- Labeling

- TTB label approval if malted barely and hops
- FDA Food labeling if not
 - Nutritional Labeling if not except
 - Ingredients

- pH

- Alcohol

- Other flavorings and colorings can be regulated

Recipe Adjustments

Each Product Requires Unique Considerations

- Sugar content
- Yeast selection
- Nutrient requirements
- Pitch rates
- Fermentation profile/temperature

Flavor Impact

Apart from ethanol and CO₂, yeast significantly contributes to the flavor and aroma

- Esters
- Alcohols (fusel)
- Vicinal diketones (diacetyl, 2,3-pentandione)
- Aldehydes (primarily acetaldehyde)
- Phenols
- Organic acids
- Sulfur compounds
- Fatty acids

Flavor Impact

Negative Results

Stuck fermentations/High finishing gravity
High ester production
High fusel alcohol production
Poor conditioning of diacetyl/acetaldehyde
Unwanted sulfur production

Lack of nutrients, improper strain selection, miscalculated pitching rates or unregulated fermentation temperature can lead to a poor tasting product.

Carbohydrate Source

Differentiates Type of Beverage

Source:

- Grain
- Honey
- Molasses
- Fruit
- Processed sugars

Sugars:

- Sucrose
- Dextrose
- Maltose
- Maltotriose
- Glucose
- Fructose
- Dextrins

Strain Selection

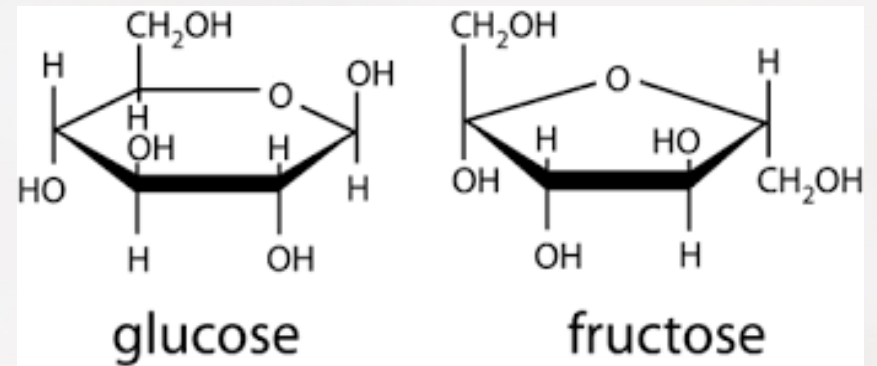
Select a yeast strain that does well in the fermentation environment and produces a desired flavor profile

Considerations:

- Hundreds of choices available
- Dry or Liquid cultures
- Alcohol tolerance
- Ability to ferment abundant carbohydrate
- Speed and performance
- Nutrient requirements (FAN)
- Fermentation temperature range
- **FLAVOR**

Nutrient in Fermentation

- Carbohydrates (carbon- sugars)
- Amino acids (nitrogen)
- Fat (sterols, fatty acids)
- Minerals (Zinc, Calcium, Magnesium)
- Vitamins
- Oxygen (from aeration or agitation)



**BUILDS HEALTHY CELL MEMBRANES FOR PROPER
FERMENTATIONS AND TRANSPORT**

Nutrient Requirements

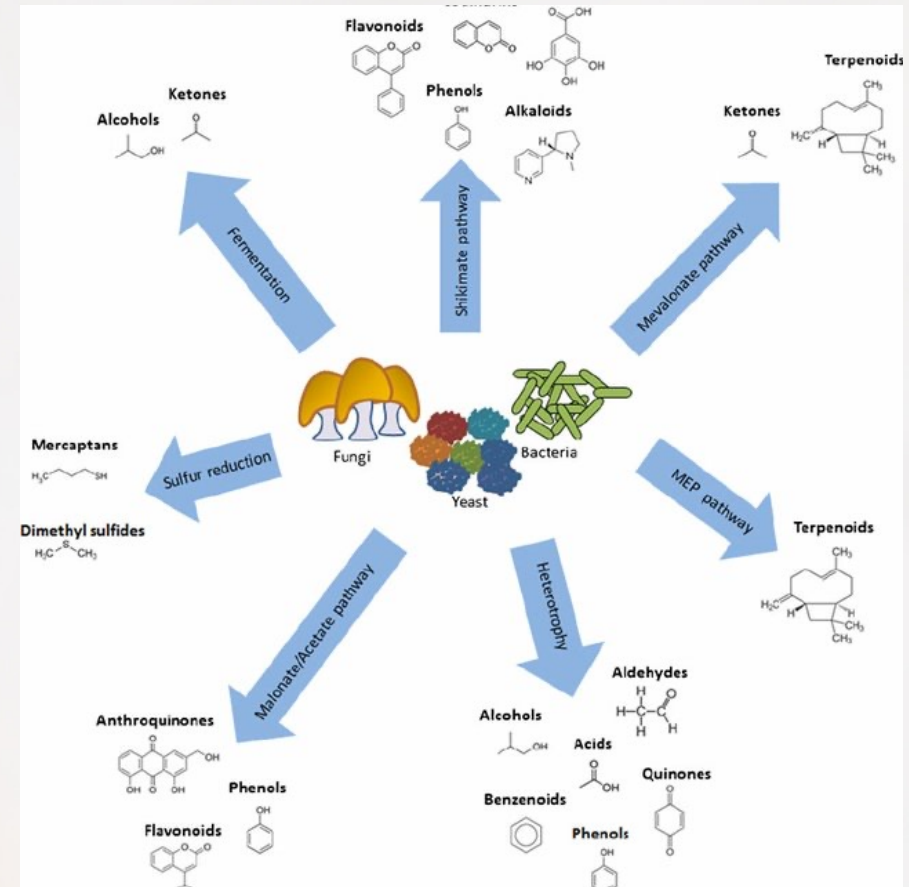
Avoiding Stuck Fermentations

- Using malted barley provides the majority of nutrients required by yeast
- Fermentations of simple sugars generally lack the needed nutrition for complete and healthy fermentation
- Yeast nutrient and FAN additions will supply the yeast with the necessary minerals and nitrogen to complete the job

Nutrient Requirements

What do organisms do with them?

- Responsible for metabolism aka making energy
- Helps produce other compounds that protect the organism



Nutrient Deficiencies

Hard Kombucha

High in sugar, low in nutrients

This is ok for non-alcoholic kombucha, but need additional nutrients for alcoholic kombucha

Nitrogen: Contains low amounts of amino acids

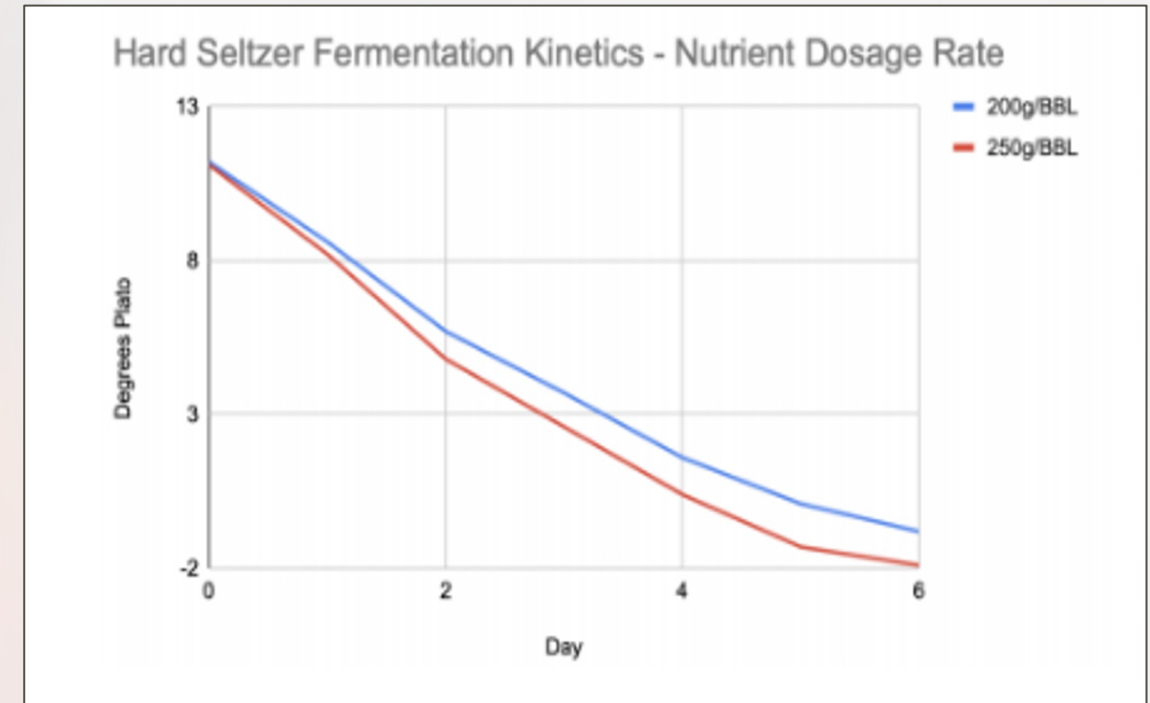
Element	Average daily intake (range) (mg/day)	Elemental concentrations of tea infusions (mean) (mg/l)
Al	5 (2–10)	2.94
Cu	2.5 (2–3)	0.05
Fe	15 (10–18)	0.006
Mn	4 (2–5)	4.6
Zn	15	0.19

Street, Renée A. et al. "The Status of Micronutrients (Cu, Fe, Mn, Zn) in Tea and Tea Infusions in Selected Samples Imported to the Czech Republic." *Czech Journal of Food Sciences* 24 (2018): 62-71.

Nutrient Deficiencies

Hard Seltzer

- Devoid of yeast nutrients needed for healthy fermentations
- Yeast require:
 - Fatty acids: build cell membrane
 - Amino acids: build proteins
 - Minerals: cofactor of metabolism
- Nutrients should have:
 - Peptone and yeast extract
 - Provides fatty acids, FAN, nucleic acids, vitamins and minerals
 - With DAP or DAP-free?



Pitch Rates

Pitch rates are dependent on multiple factors including, but not limited to:

- Fermentation temperature
- Gravity
- Oxygen
- Strain
- Nutrition

Pitch Rates

Sample Pitch Rates for Different Beverages

Beverage Type	Pitch Rates
Non-Alcohol/Low Alcohol	2 – 8 million cells/mL
Hard Seltzer	0.75 – 1.5 million cells/mL
Cider	5 – 8 million cells/mL
Mead	5 – 8 million cells/mL
Spirits	2 – 20 million cells/mL

Fermentation Profiles

Sample Pitch Rates for Different Beverages

Beverage Type	Pitch Rates
Non-Alcohol/Low Alcohol	50-65°F (10-18°C)
Hard Seltzer	63-73°F (17-23°C)
Cider	68-75°F (20-24°C)
Mead	68-75°F (20-24°C)
Spirits	68-86°F (20-30°C)

The Takeaways

- Demand is rising for alternative beverages, and breweries are pivoting. Understanding how to make these beverages well is tantamount.
- Each beverage has a unique set of requirements that can differ slightly or significantly from beer making
- Understanding yeast requirements, specifically strain selection and nutrition, will aid in creating consistent, healthy, and most importantly, flavorful and high-quality fermentations



THANKS!