# A Guide To Blending Yeast Strains

KARA TAYLOR

WHITE LABS SAN DIEGO, CA

ANALYTICAL LAB MANAGER

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PURE YEAST & FERMENTATION

# Outline

- History of blending yeast strains
- What are the benefits of yeast blending?
- Ways to improve fermentation performance and flavor complexity
- Looking at data for a few fermentations
- Drink beer!

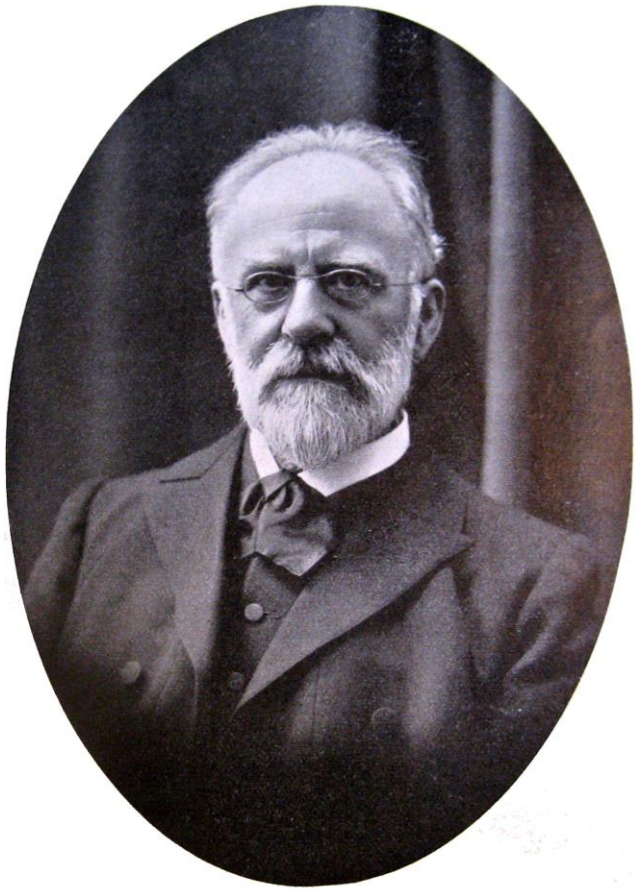
# A little history about blending yeast

In early brewing history, beers were most likely a combination of multiple strains due to not having the ability to isolate a pure yeast strain

Brewers have been brewing with pure yeast cultures from the moment Emil Christen Hansen developed pure culture techniques in the 1880's

He developed a device to propagate a pure strain of yeast and 100's were being used within years

Currently, most breweries are using a pure strain



# Why should you experiment with yeast blending?

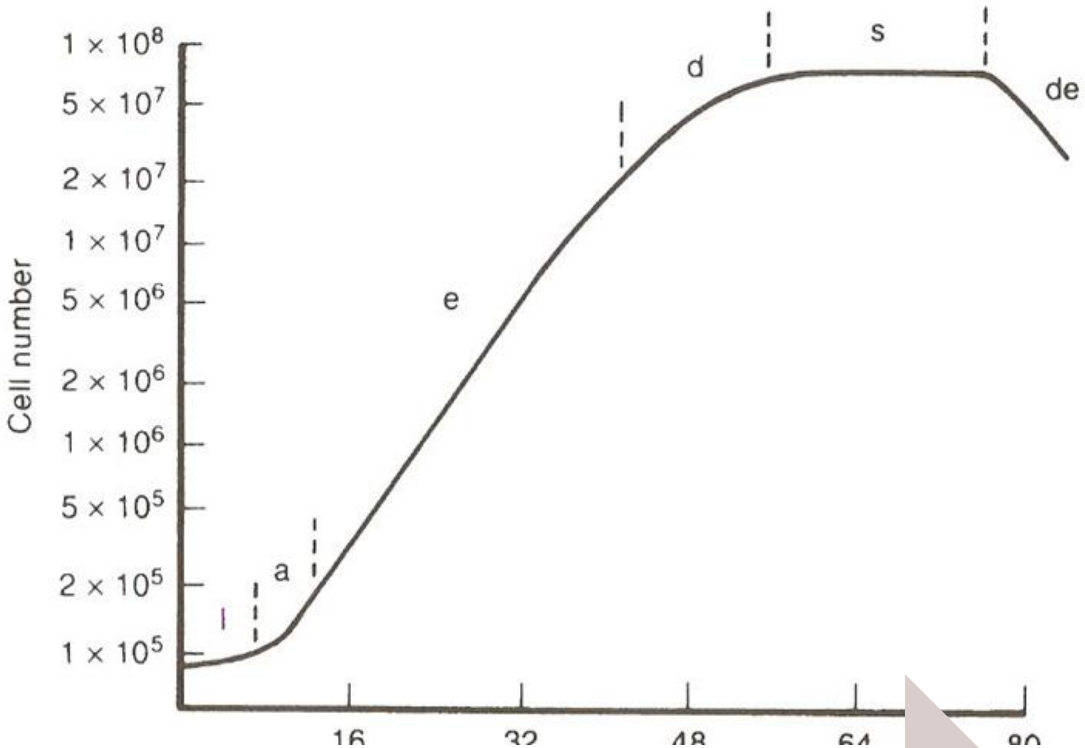
Add unique and more complex flavors to your brews

Combine alcohol tolerant strains with less tolerant strains of a flavor profile you enjoy

To help finish out attenuation of a beer

To help with conditioning aspects, such as flocculation

# Yeast Overview- Stages of Yeast




Lag Phase

Exponential Phase

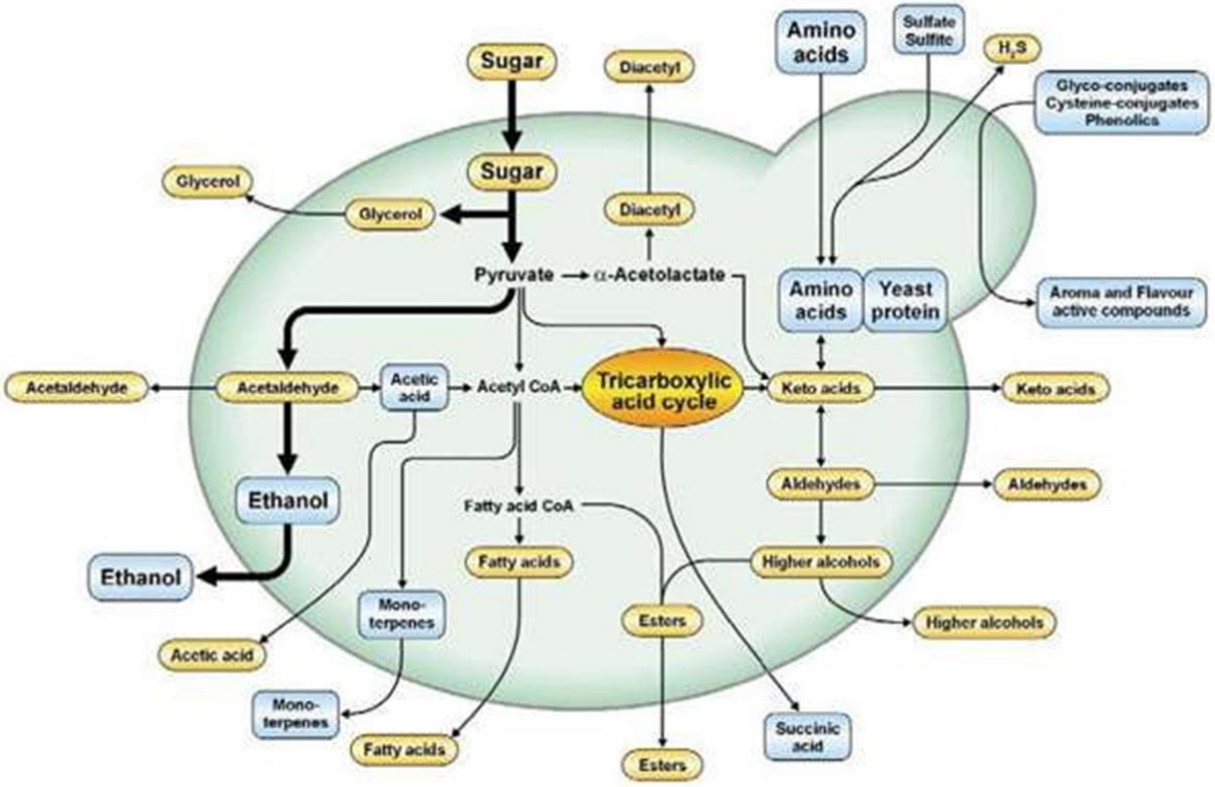
Stationary Phase

Death Phase

# Producing flavor compounds

In 72 hours most flavor compounds are formed. 50% of carbohydrates are fermented with in 48 hours

- Adding yeast later than 72 hours is unlikely going to add to the flavor and aroma of that beer



# Goal 1: Enhanced Flavor Profiles

Add two different Hefeweizen yeast to soften the ester and increase the phenolic characters

Brewery in Florida

German Hefeweizen
OG 13.4  F.G 2.8
79% Attenuation (WLP380)
Servomyces used

| WLP300 German Hefe | WLP380 Hefe IV |
|---|---|
| 50% | 50% |

Brewer Comments:
3 Day Fermentaiton, first feneration
Not re-pitched
Very balanced flavors, good phenolic , nothing overbearing. Balanced and more complex than previous batches using WLP300. Banana flavors were not as strong and other phenolics balanced the profile.

*Reference: Chris White's Using Single Yeast Strains in a single fermentations poster at CBC 2003*

# Goal 1: Enhanced Flavor Profiles

Another Brew

Weizen dunkelbock by a brewery in Madison, WI

OG 18.3-5.0

Ferm temp: 63F ramped to 68F

1 blended yeast addition

| WLP380 Hefe IV | WLP830 German Lager |
|---|---|
| 70% | 30% |

Comments: Good weizen flavor, diminished as the yeast flocculated out
Would do 60/40 blend next time

# Goal 2: Improving Fermentation Performance

Finicky yeasts

- WLP565 Saison Ale Yeast is known to be finicky
  - Add WLP565, then 2 days later add WLP500 to help finish the fermentation

Low Attenuation Yeast

- WLP002 English Ale Yeast and WLP007 Dry English Ale Yeast together to get the esters and higher attenuation that you want

# Goal 2: Finishing a beer

Brewery in San Diego

| | WLP5019 | WLP001 |
|---|---|---|
| Gravity | 1.094-1.030 | 1.030-1.014 |

OG 1.094  Typically a difficult beer to ferment

Added house yeast, then added WLP001 at 1.030 to finish it out

Comments: Flavor of first yeast provided malt balance while active second pitch helped to dry out the beer

(Typically their house strain might be very stressed out in this instance, producing off flavors)

# Blending to finish a stuck fermentation

Champagne yeast

- Popular to add champagne yeast to finish a beer that didn't ferment to the desired finishing gravity
- Hardy yeast used to dealing with harsh environments such as high alcohol content, low nutrient
- Not a lot of esters production, some phenols production
- Champagne yeast will not metabolize maltotriose
- Some are a "Killer Yeast"- will outcompete brewers yeast so don't repitch!

# Things to take into consideration when blending yeast for stuck fermentations

Amount of residual sugars

- Is there any?

Amount of alcohol present

- How will that secondary yeast perform in addition to alcohol

Nutrient concentrations

# Making Blended Starters

Different ways to do this

- 2 vials, 2 starters = ensures ~ equal cell counts
- 2 vials, 1 starter= blend proportions may differ
- 1 pre-blended strain in starter= blend proportions may differ

# Frankenstout

White Labs beer made with 96 yeast strains

- Produces lots of complex flavors and aromas
- Phenolic and banana characteristics most apparent
- Culture re-pitched into multiple different brews:
  - Stout, Red, Lager

# Experiment WLP545 w/ WLP002

**Cone 1:Control** **Cone 2** **Cone 3** **Cone 4**

**Day 3 of Fermentation: WLP002 was added to Cone 2 on this day**

# Experiment WLP545 w/ WLP002

**Cone 1:Control** **Cone 2** **Cone 3** **Cone 4**

**Day 4 of Fermentation: WLP002 was added to Cone 3 on this day**

# Experiment WLP545 w/ WLP002

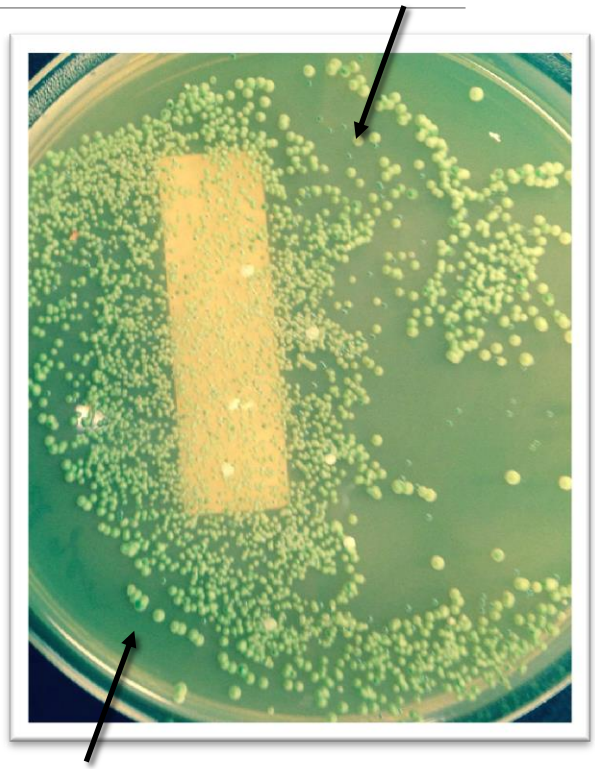

**Cone 1:Control** **Cone 2** **Cone 3** **Cone 4**

**Day 5 of Fermentation: Flocculation is already happening, adding WLP002 would have been too late to aid in coflocculation**

# Experiment: WLP575 over 4 generations

WLP575 Vial

Second Generation



Third Generation

**Using WLN plates, the different colony dye uptake is visible for the different yeast. Over the fermentations a different in proportions of colonies is visible**

# What happens to the flavor if the yeast proportions change?

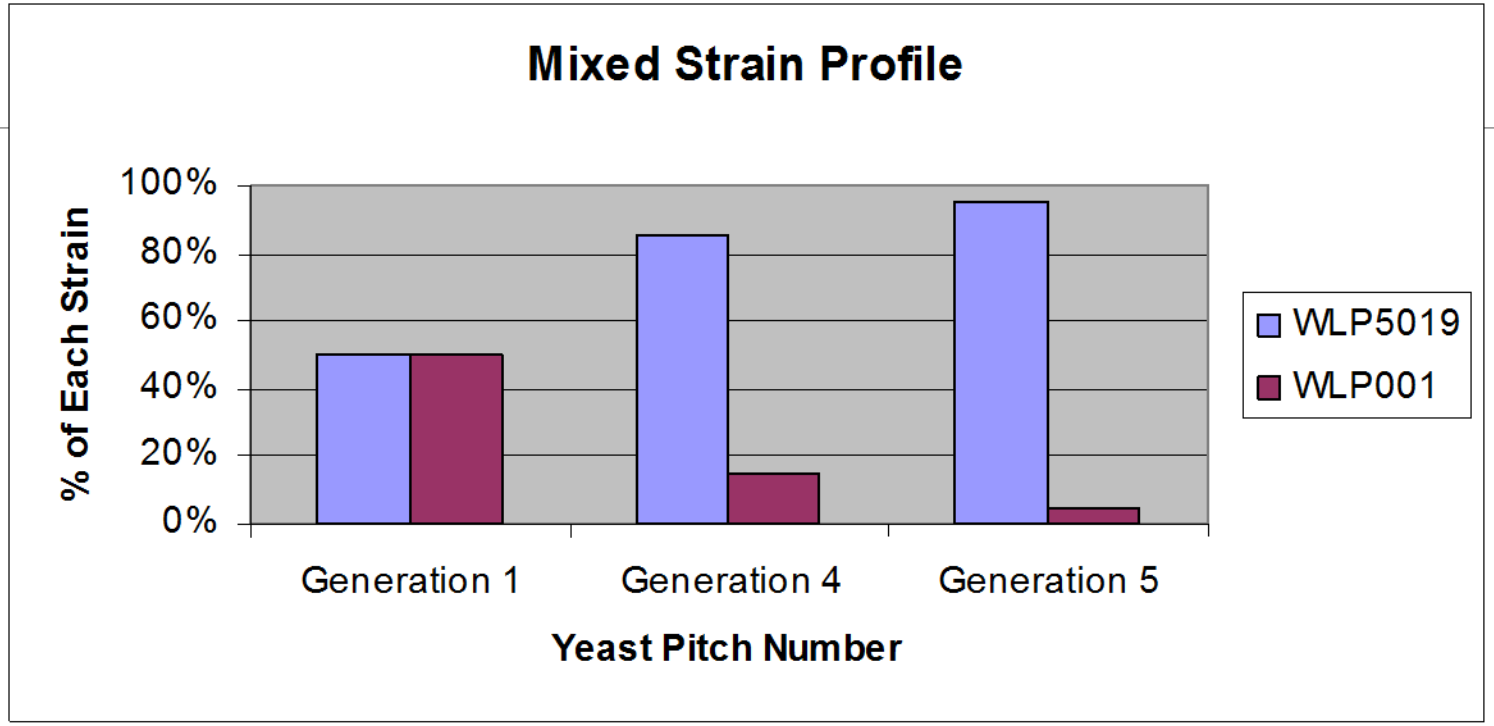
Brewery in San Diego using 50% WLP5019 and 50% WLP001

| WLP5019 | WLP001 |
|---|---|
| 50% | 50% |

WLP5019 was too malty for their IPA but liked the flavor profile. Added the WLP001 to help dry out the beer

Blend gave desired profile, and in this instance was used for 5 generations. #3 was 'perfect'. Generations 4 & 5 produced desired flavor and attenuation, even though data shows (in next figure) a change in collection percentage.

# What happens to the flavor if the yeast proportions change?




**So why is the flavor and attenuation staying the same but the proportions changing?**

**There's millions of cells in solution. In generation 5 you still have, for example, in a 1.050 beer 1,800,000 cells/ ml. (12 million cells/ml total, WLP001 is 15% of the total cells)**

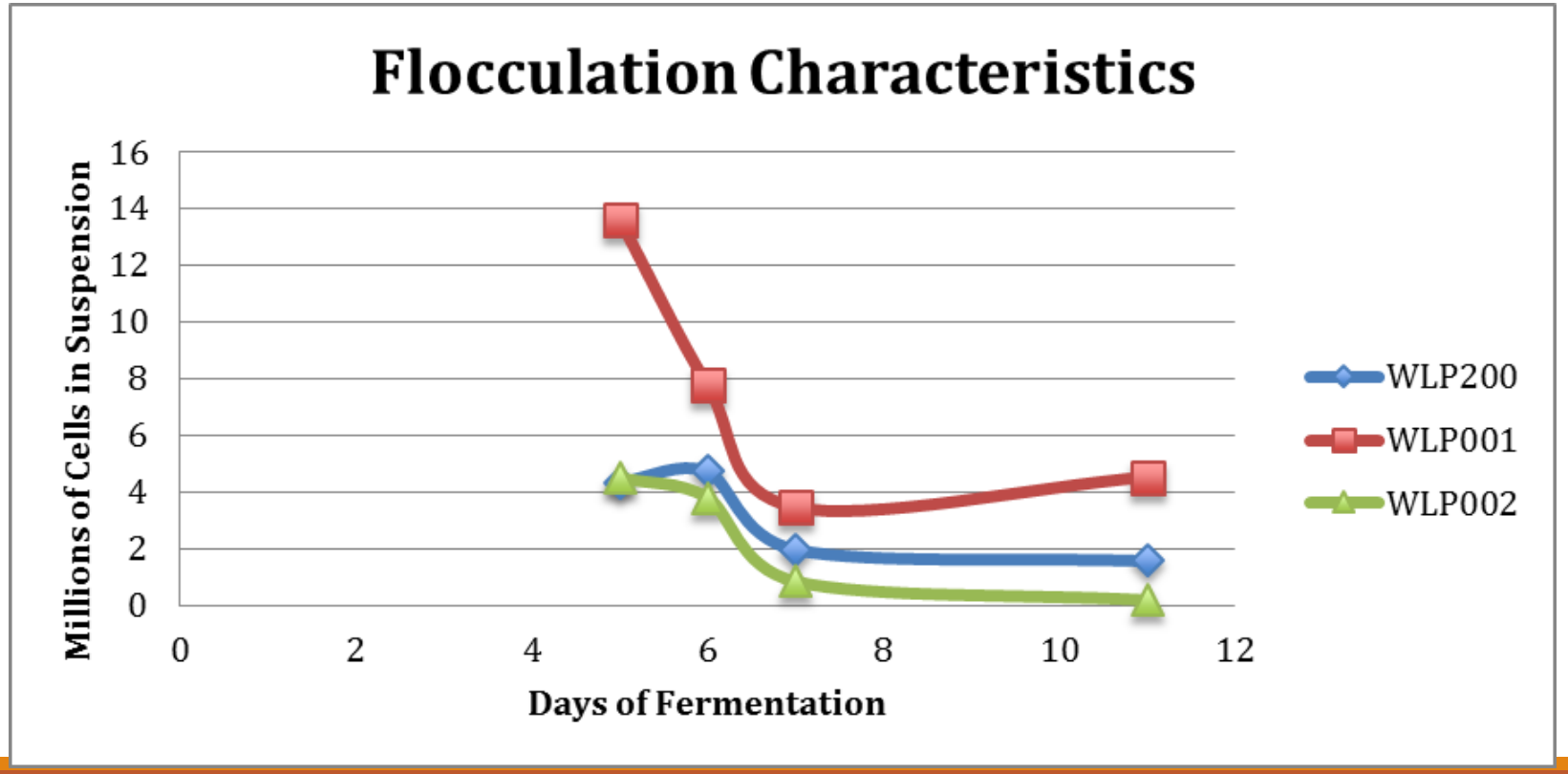
**There's still a large amount of yeast to help reduce that attenuation.**

# Experiment: WLP200

WLP200 Best of Both Worlds Yeast Blend

Blend of WLP001 of WLP002

Lower amount of WLP002 yeast to help the WLP001 dominate for flavor



# Beer Data

ESB beer made at White Labs

| Parameter | WLP001 | WLP002 | WLP200 |
|---|---|---|---|
| Alcohol by Volume | 6.48 | 6.18 | 6.26 |
| Attenuation | 86.67 | 81.19 | 84.78 |
| Specific Gravity | 1.007 | 1.010 | 1.008 |
| Original Gravity | 1.057 | 1.057 | 1.057 |

Data shows that attenuation of WLP200 is almost equivalent to WLP001 allowing this strain to have similar attenuation of WLP001 and similar flocculation of WLP002

# Let’s Drink!

Citra Pale Ale made with WLP200

# Summary

Know your goal when picking out what yeast strain you want

- Attenuation, flocculation, complex flavor and aroma compounds
- By using multiple strains, you can increase alcohol/attenuation levels in addition to creating more complex flavors and aromas

Even though proportions of strains are changing generation to generation, there's typically enough cells to still perform similarly

For yeast to contribute to the flavor and aroma of a beer, it needs to be added within 72 hours of fermentation

Adding a highly flocculating yeast after Day 3 of fermentation didn't help flocculating the yeast out of solution

# Thanks!

Kara@whitelabs.com

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*References: Yeast: The Practical Guide to Fermentation by Chris White and Jamil Zainisheff*

*Chris White's Using Single Yeast Strains in a single fermentations poster at CBC 2003*

*Thanks to Chris Graham and the MoreBeer staff for making all of the beer for my talk!*