

Yeast Handling, Storage, & Maintenance

Kara Taylor

Technical Laboratory Manager

White Labs, San Diego CA

May 2019

Yeast Handling – What Do We Mean?

Best practices for working with yeast

- Maintaining a pure culture
 - Avoiding contamination by bacteria, wild yeast, or cross-contamination of brewing strains
- Maintaining a healthy culture
- Minimizing stress to yeast

How Use Liquid Yeast Multiple Times?



How Many Strains?

How Many Generations?

How Collect and Re-Use?

How Keep it Healthy and Clean?

Do I Need a Lab?

Yeast Maintenance

Consistent pitch rate

- Fermentation speed
- Flavor profile
- Identification of problems early

Pitch the right amount of yeast for your beer!

Weight, volume, % yeast solids

Yeast Maintenance

Re-pitching yeast – what to expect

- How many generations? – conditions & strain
 - Ales: 8-10
 - Lagers: 3-5
 - Wheat & Belgian: 3 or less
- First generation vs. later generations – why the differences?

Yeast Collection & Harvesting



Yeast Collection & Harvesting

- Generally, at end of fermentation, within 1-2 days of FG
- Hazy and highly hopped beers-
 - Pre-dry hop
 - If harvesting before terminal may experience low yield
- Low flocculant strains
 - Hefe and Belgian strains
 - Using aides like added pressure (5 psi head pressure) to help encourage flocculation
 - Agents like Biofine

Yeast Collection & Harvesting

How should yeast be collected?

Top Cropping

Benefits

- Yeast rises at a time of high vitality and viability
- Free from trub – better shelf life
- Faster turnaround time for yeast collection

Disadvantages

- Beer & yeast are exposed to environment

Yeast Collection & Harvesting

How should yeast be collected?

Top Cropping – Best practices

More flocculent yeast = better top croppers

- Timing – 48-72 hours
- Location – past first layer (protein)
- Skim yeast with a paddle, shovel, or bucket which can be sterilized (stainless steel)

Yeast Collection & Harvesting

How should yeast be collected?

Bottom Cropping

Benefits

- Equipment design lends well to bottom cropping
- Some strains can't be cropped from top

Disadvantages

- Breakdown of yeast happens faster – stress from hydrostatics, alcohol, temperature
- High percentage of trub
- Turnaround time to collect yeast is longer

Yeast Collection & Harvesting

How should yeast be collected?

Bottom Cropping – Best practices

- Timing – end of fermentation, depending on strain
 - Remove as soon as possible without risking integrity of beer
- Discard the first runnings
- Use only the middle pack

Yeast Collection & Harvesting

Stratification of yeast during collection

Beer →

Healthy yeast →

Trub and dead yeast →



Yeast Collection & Harvesting

How should yeast be collected?

Cone to cone?

Need to visually verify yeast

- Color
- Trub
- Concentration
- Contamination analysis



Aber instrument

Collection Options

Yeast Storage

Showing all 2 results



SABCO Bright – 15.5 Gal.
\$380.00



White Labs 'Ferm-Flask' by
SABCO
\$1,500.00-\$1,800.00





Smaller Scale

1) Harvest yeast

← BEER

← GOOD YEAST

← DEAD YEAST/ TRUB



2) Add sterile water and swirl

← BEER/WATER

← TRUB/DEAD YEAST

← GOOD YEAST

} POUR OFF

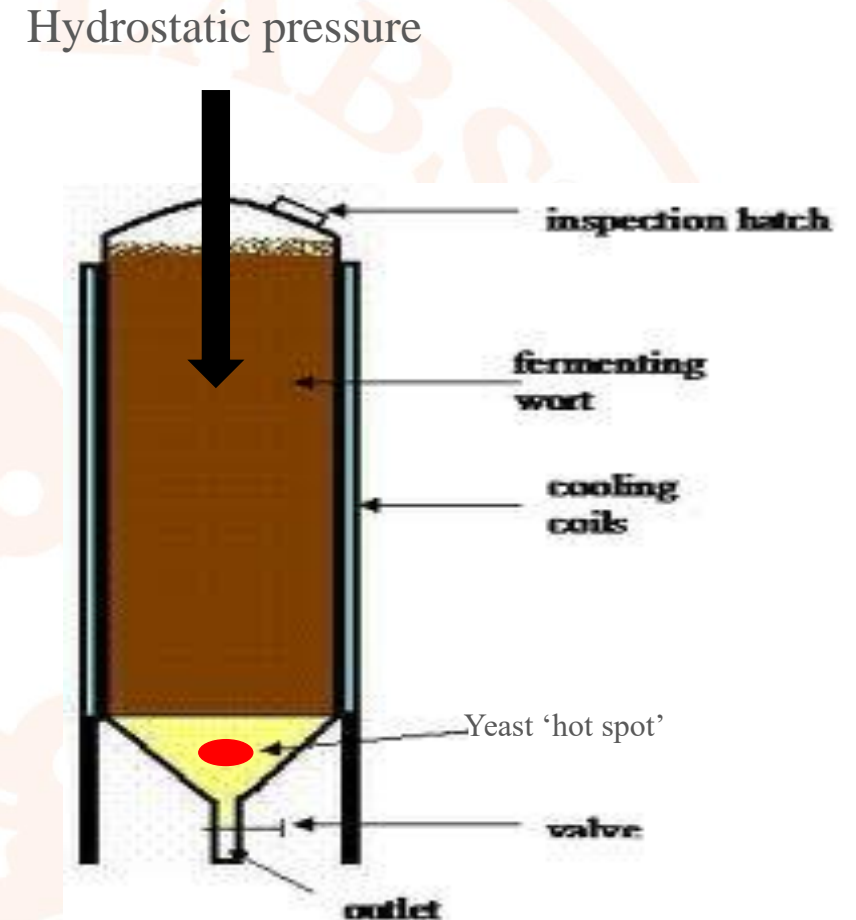
Storage

Cone storage can be stressful

- Hydrostatic pressure
- Inhospitable environment – alcohol
- Temperature in the cone

Storage Medium:

- On beer, wort, or water?
- Beer – no transfer; great short term if under 6% alcohol
- Wort – short term; carbohydrates present can be harmful
- Water – best long term solution because it's neutral



Storage

Considerations for yeast storage:

Objective:

Keep metabolic activity to an absolute minimum in order to preserve viability and vitality

1. Chilling the yeast

Chill yeast to between 2 - 4 °C

- Keep metabolic activity to an absolute minimum

If colder than 2°C

- Risk of freezing the yeast
- Irreparable cell damage and subsequent death

Storage

Considerations for yeast storage:

1. Chilling the yeast (cont'd)

If warmer than 4°C

- Alcohol toxicity
- Limited nutrients
- Depletion of glycogen
- Loss of viability / vitality

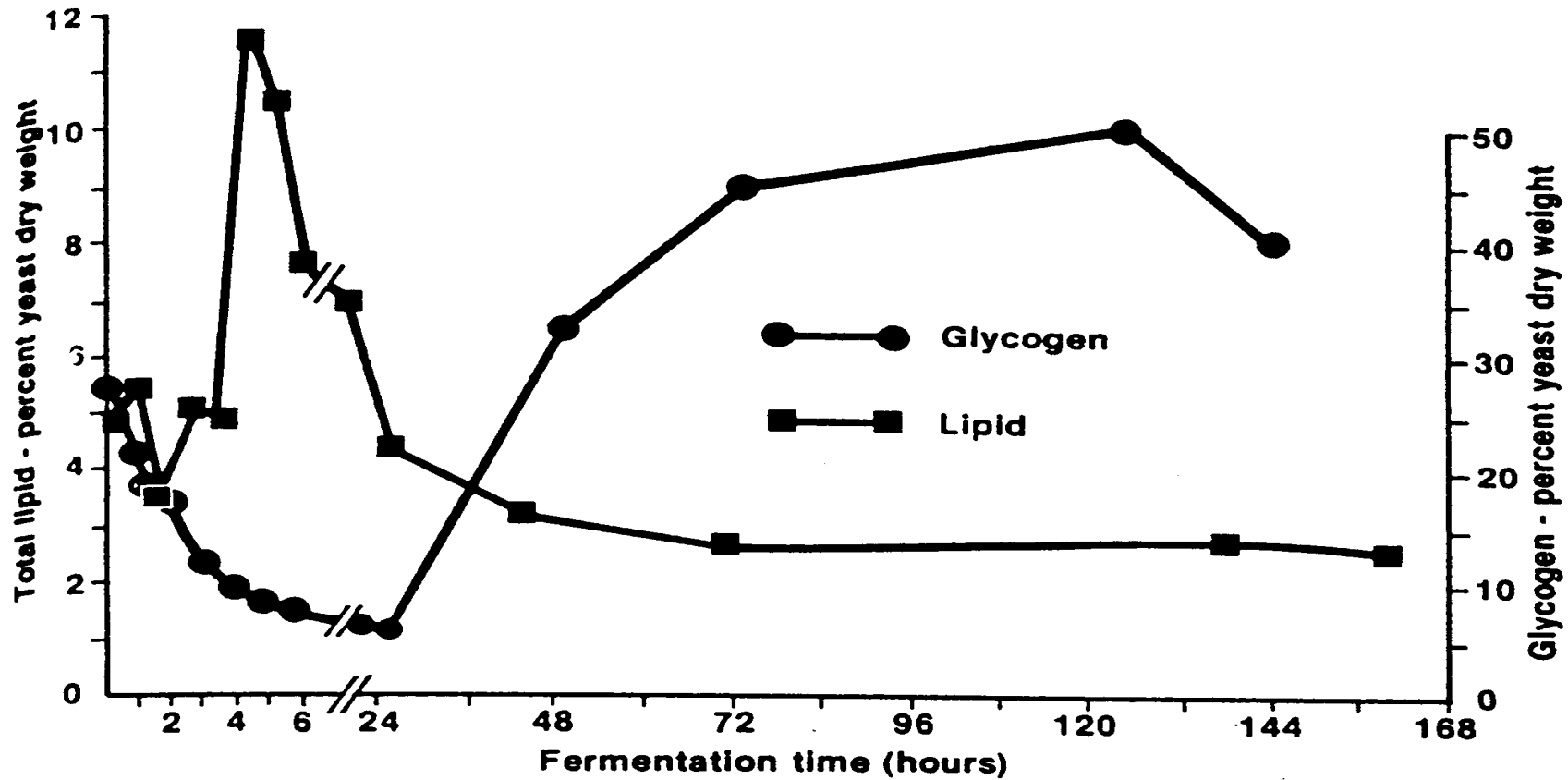
Storage

Considerations for yeast storage:

2. Glycogen and lipids

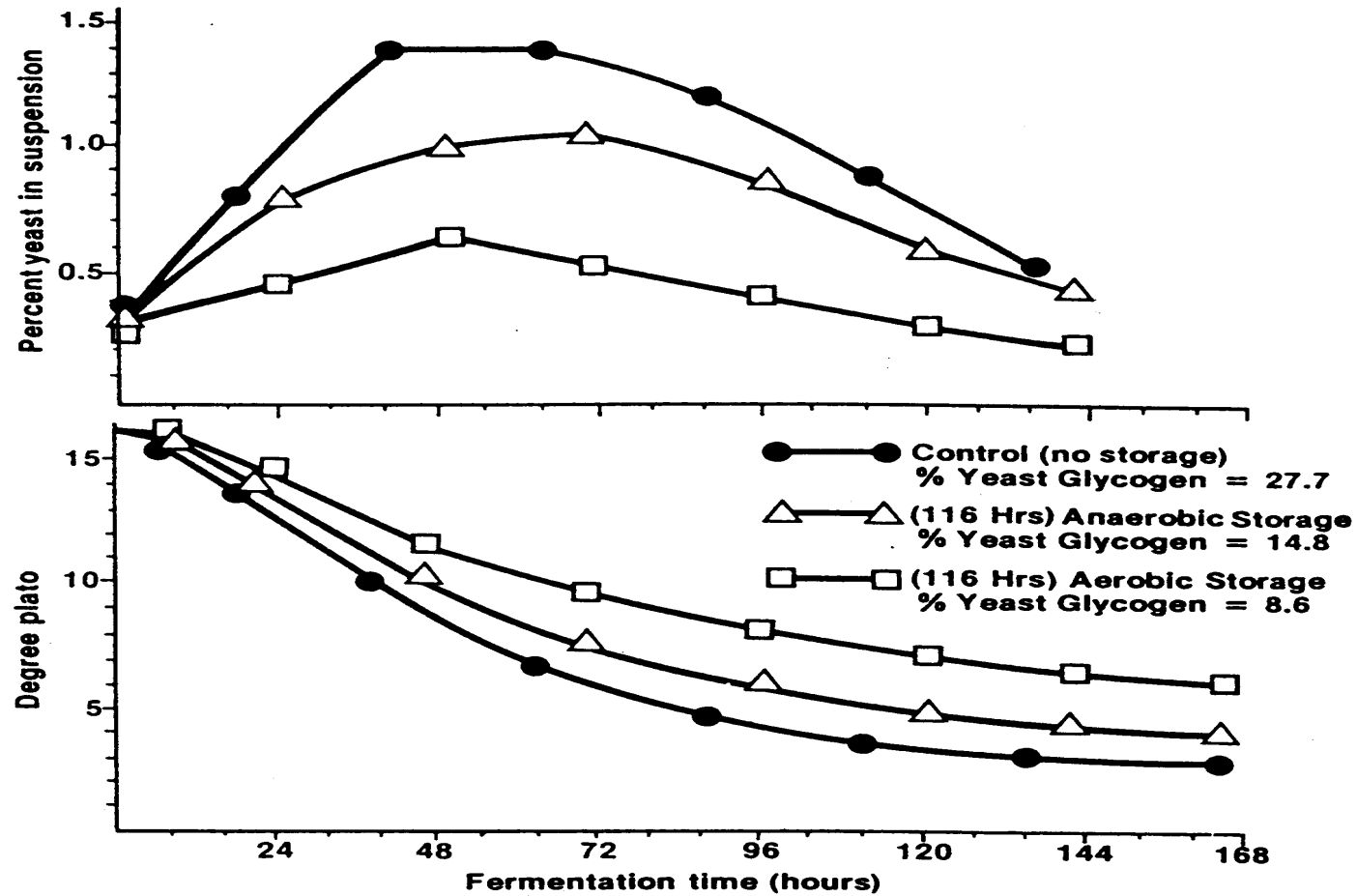
- Glycogen is the major reserve carbohydrate stored within the yeast cell.
- “Store” of to sustain the cell during periods of starvation
- In the presence of oxygen, glycogen is rapidly mobilized to fuel lipid (sterol and unsaturated fatty acids) synthesis.

Yeast Glycogen and Lipid during a 16 ° P Lager Fermentation



C.R. Murray, T. Barich and D. Taylor
MBAA Technical Quarterly, 21 (4) 1984

The Effect of Yeast Glycogen Concentration at Pitching on a 16⁰ P Lager Fermentation



C.R. Murray, T. Barich and D. Taylor
MBAA Technical Quarterly, 21 (4) 1984

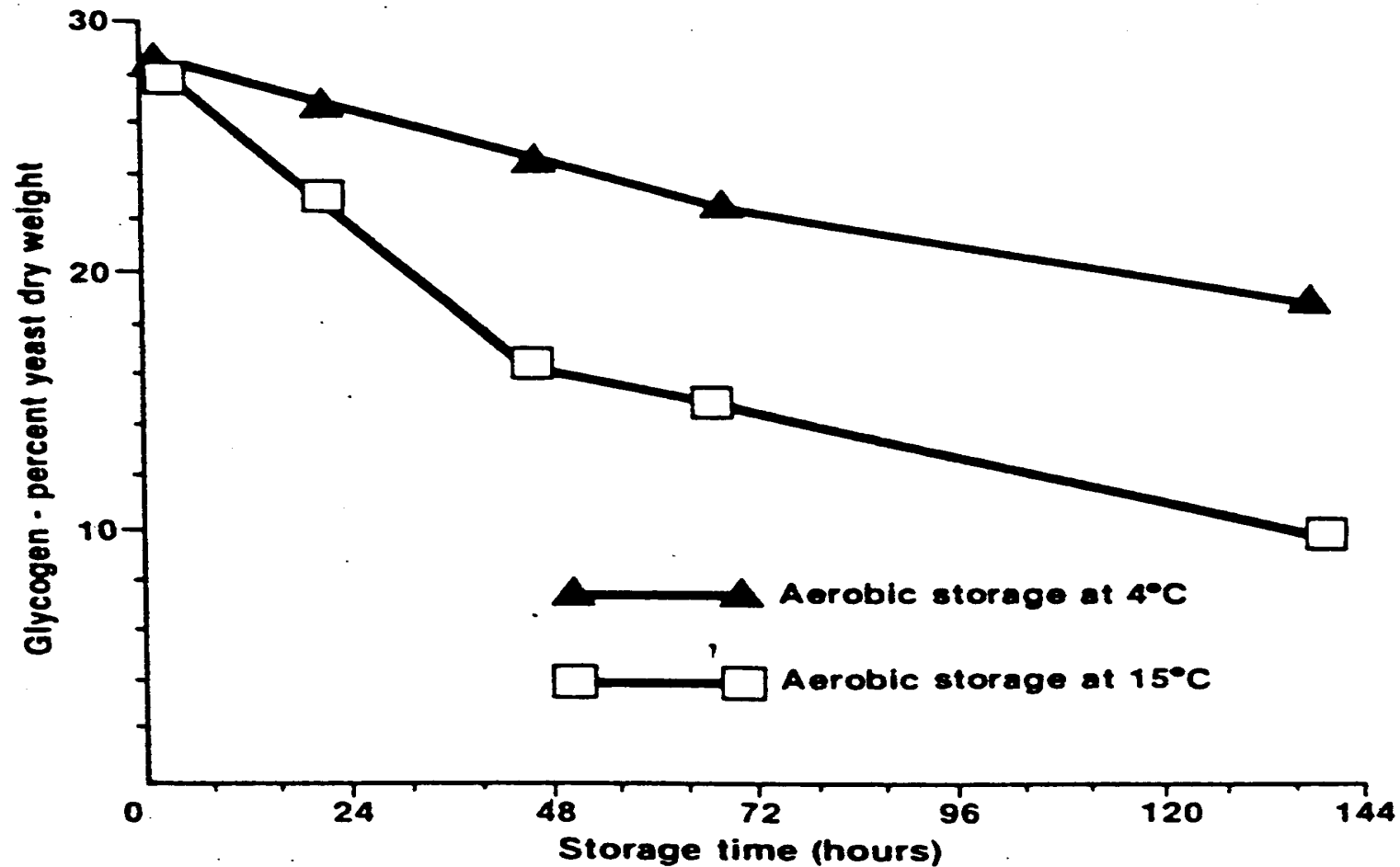
Storage

Considerations for yeast storage:

3. Temperature of storage

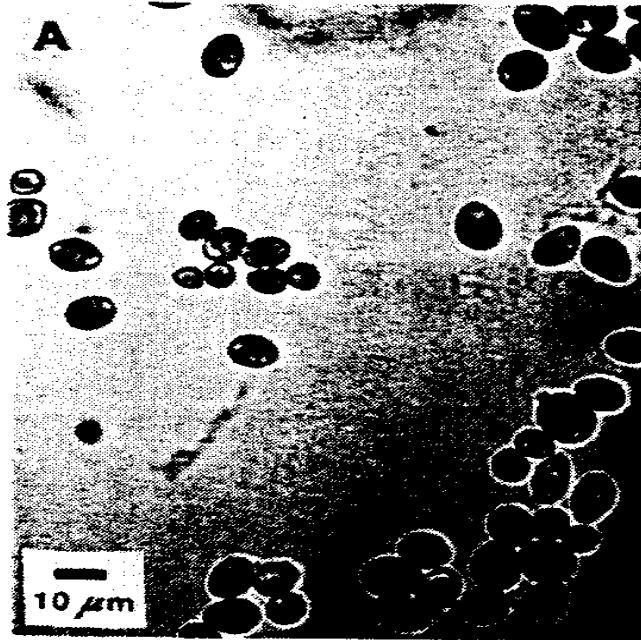
- Temperature must be maintained uniformly at $\sim 4^{\circ}\text{C}$
 - Yeast mixers - no “hot spots”
- Temperature affects glycogen storage

The Effect of Yeast Storage Time and Temperature on the Concentration of Intracellular Glycogen



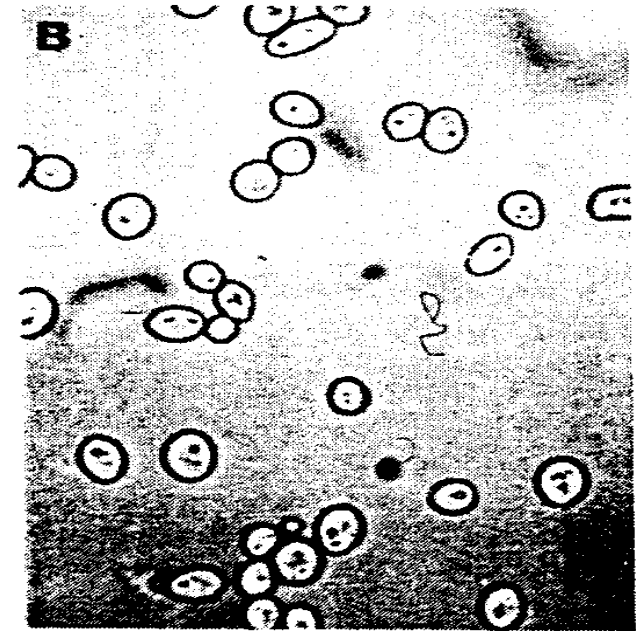
C.R. Murray, T. Barich and D. Taylor
MBAA Technical Quarterly, 21 (4) 1984

Photomicrograph of *Saccharomyces pastorianus* stained with Lugol's iodine



Fermentation Vessel
(48 hrs)

(A) Yeast removed from a 16⁰ P Lager fermentation 48 hrs after pitching.



Storage Tank
(5 days)

(B) Yeast which has been stored aerobically at 6⁰ C for five days

Storage

Considerations for yeast storage:

5. Time

- Store yeast for as short a time as is possible
 - Recommended 1-3 days, ideally
 - Up to 2 weeks, with exceptions
- Petite mutants increase with increasing storage time
- Glycogen reserves will be slowly but surely reduced
- Ethanol stress

Storage

Considerations for yeast storage:

5. Time (cont'd)

The actual time that yeast can be stored without significant deterioration is influenced by:

- Yeast strain
- Process conditions (O.G., alcohol)
- Viability / vitality of the yeast
- Storage conditions

Storage

What can I do if I need to store it longer than recommended?

- Revitalizing, in some cases
- Best practices:
 - Feed the yeast some fresh wort to activate the cells
 - Add concentrated wort (~20P) to make up 5% of total volume of yeast/wort
 - Hold at room temp for 12 hours
 - Allow dead cells to drop to the bottom and decant the active yeast into fermentation

Summary

- Harvest yeast as soon as the bulk of the yeast has separated from the beer
- Chill rapidly to ~ 4°C and maintain that temp
- De-carbonate
- Exclude air
- Store for as short a period as possible
- Pitch accurately
- Evaluate the culture before using/reusing
- Keep it clean

Thank you for listening!
Questions?

Kara@whitelabs.com