

# Yeast Handling, Storage, & Maintenance

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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



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SABCO Bright – 15.5 Gal.  
\$380.00

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

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# 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

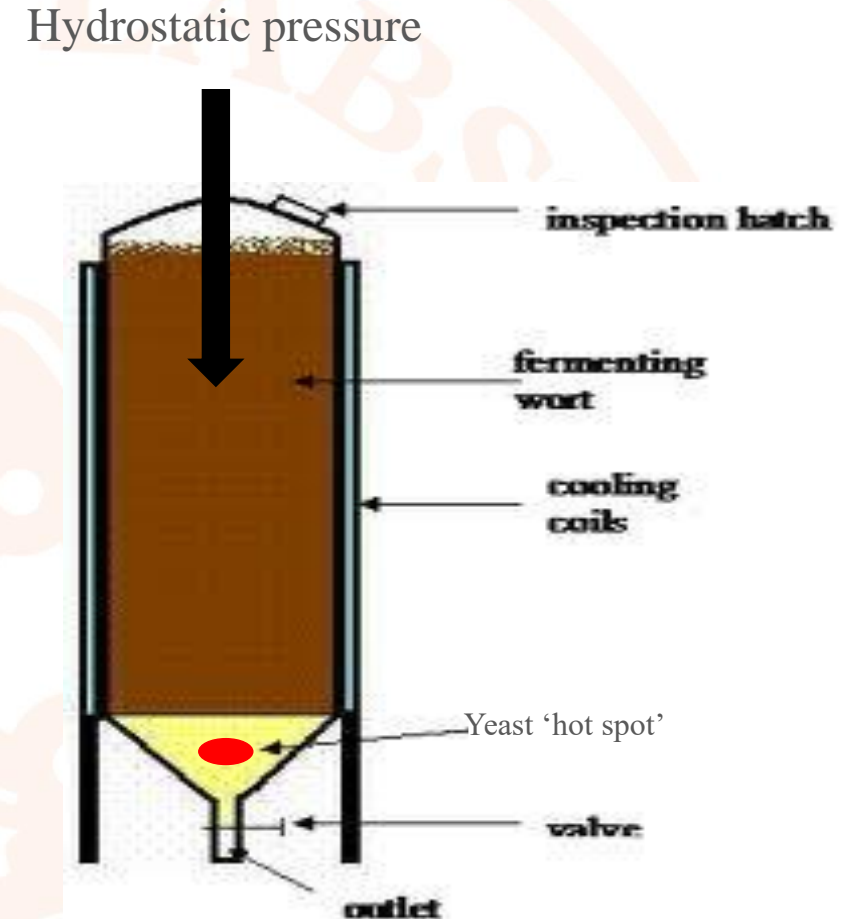
# Storage

## 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

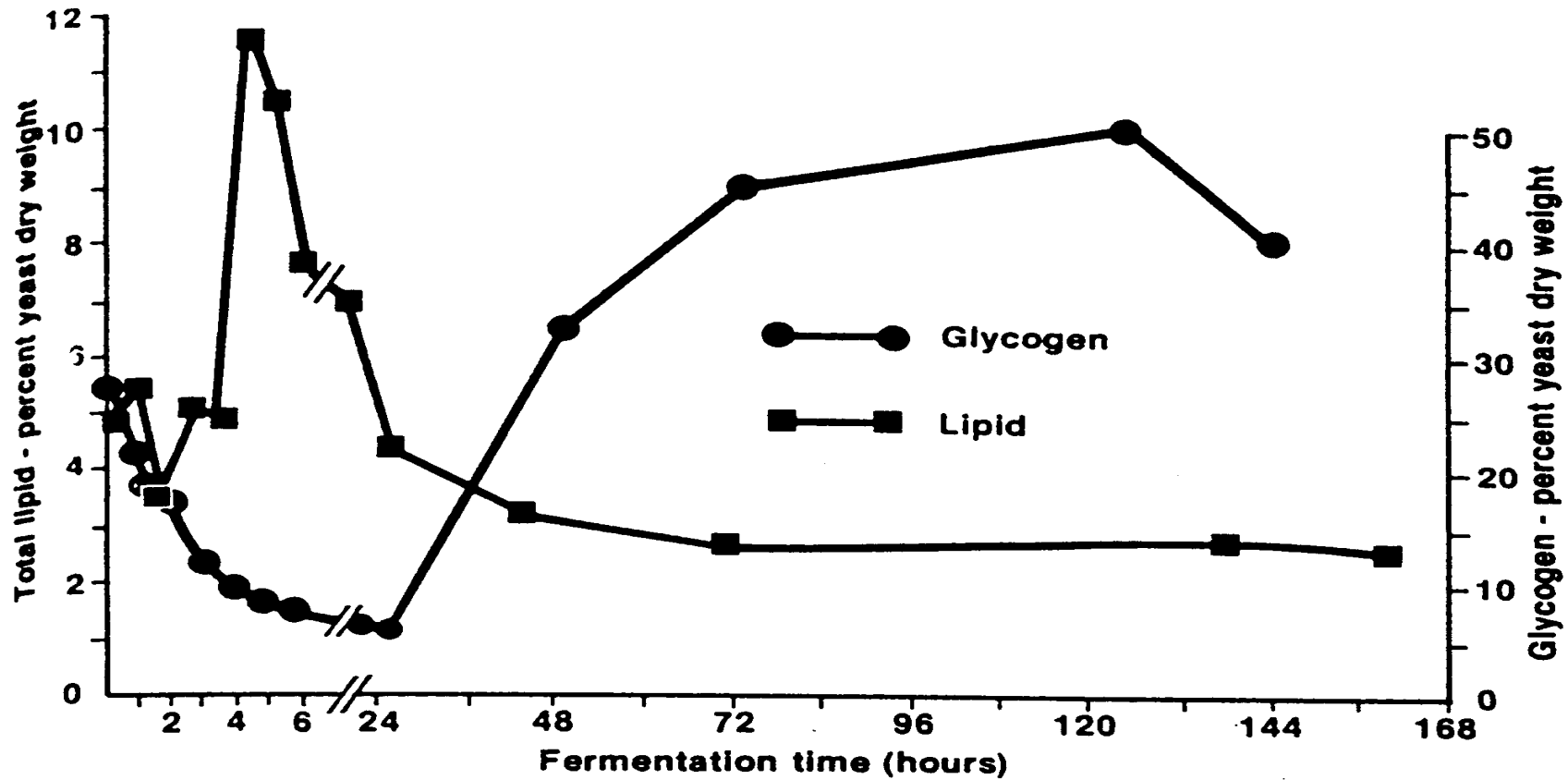
# Storage

## Considerations for yeast storage:

### 2. Glycogen and lipids

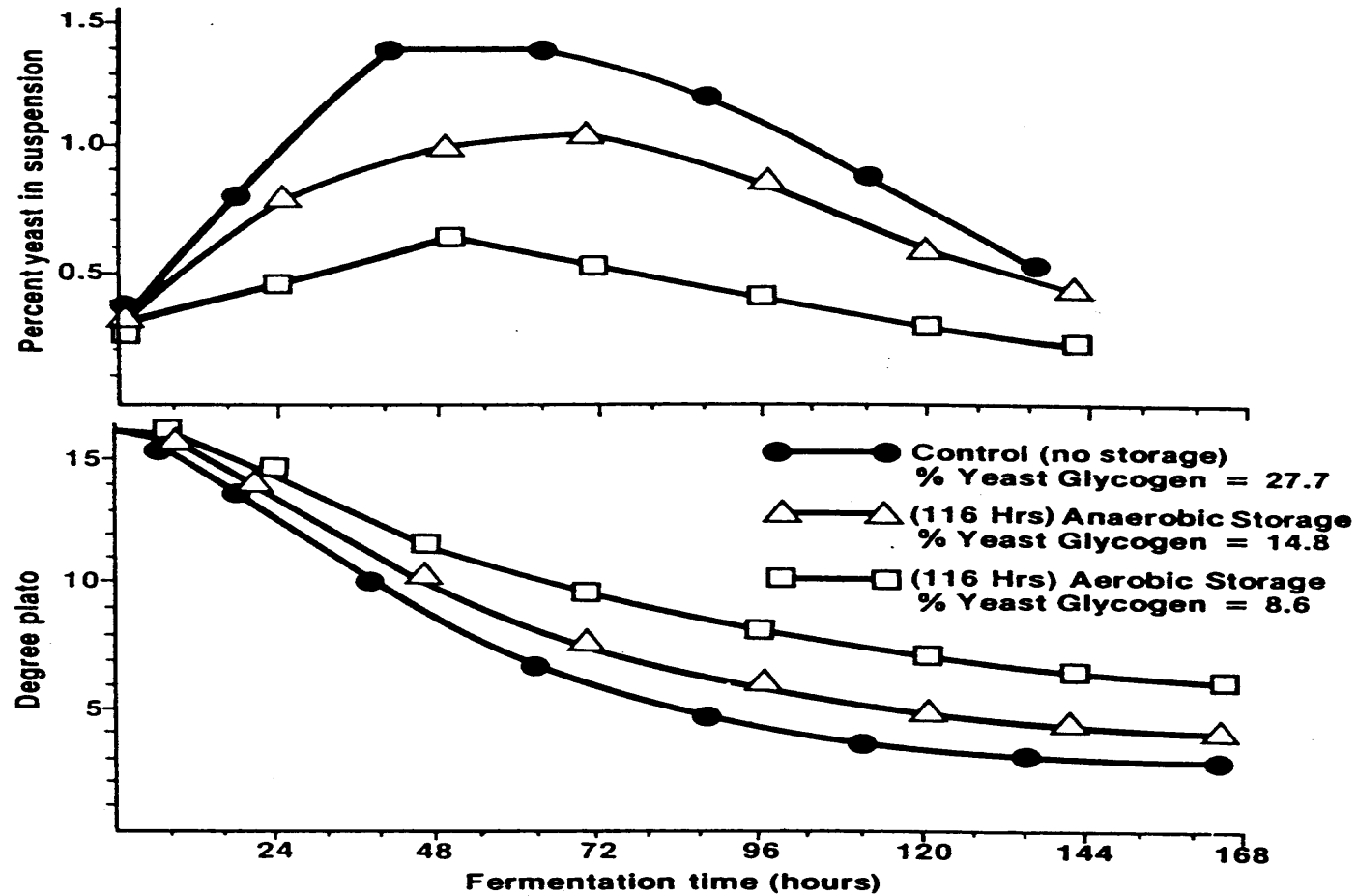
- Glycogen is the major reserve carbohydrate stored within the yeast cell.
- “Store” of to sustain the cell during periods of starvation
- In the presence of oxygen, glycogen is rapidly mobilized to fuel lipid (sterol and unsaturated fatty acids) synthesis.

# 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 16<sup>0</sup> P Lager Fermentation



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

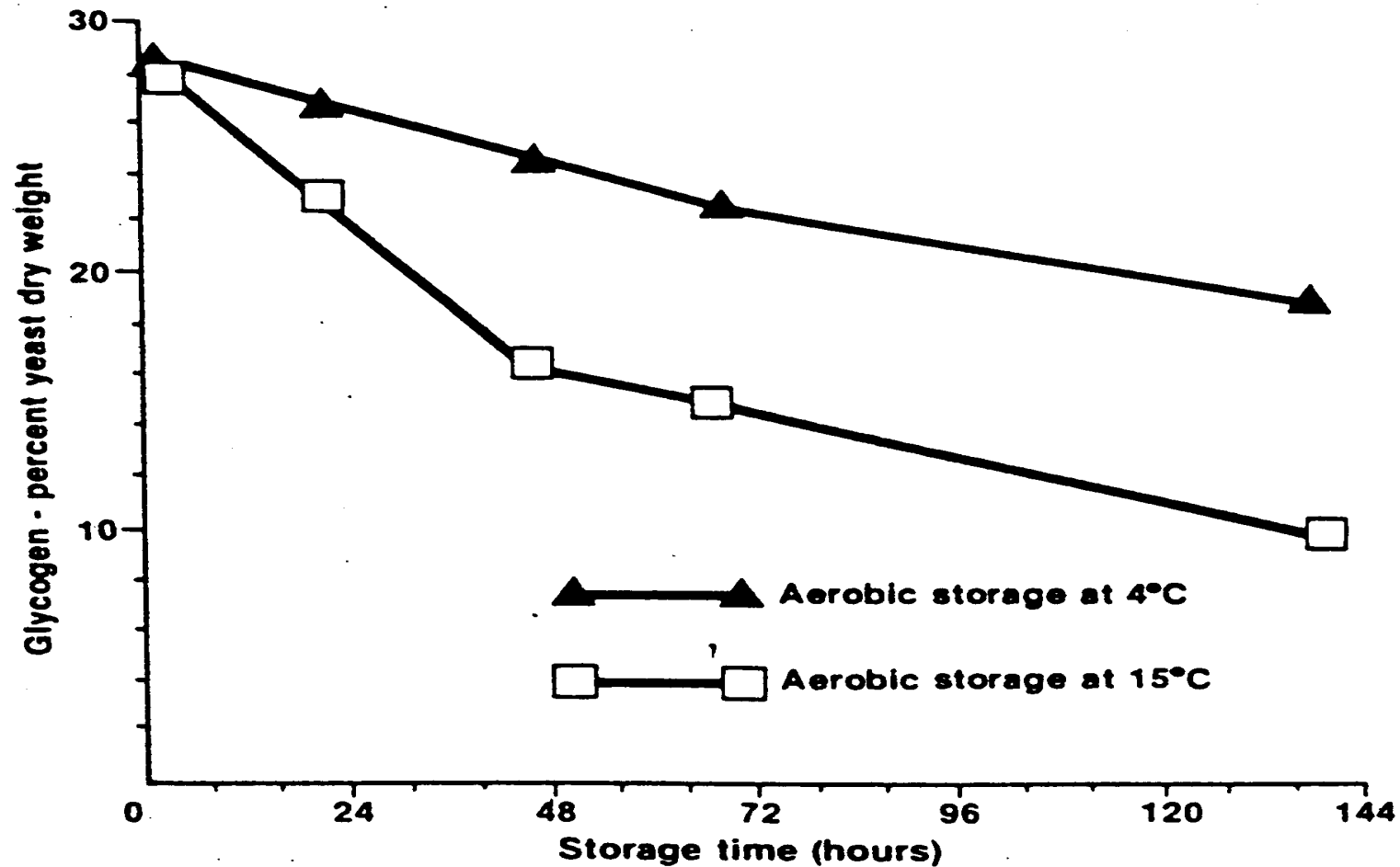
# Storage

## Considerations for yeast storage:

### 3. Temperature of storage

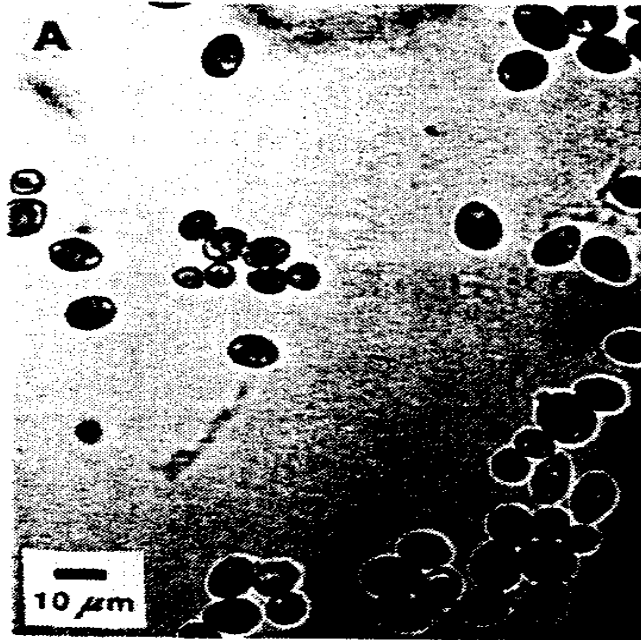
- Temperature must be maintained uniformly at  $\sim 4^{\circ}\text{C}$ 
  - Yeast mixers - no “hot spots”
- Temperature affects glycogen storage

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



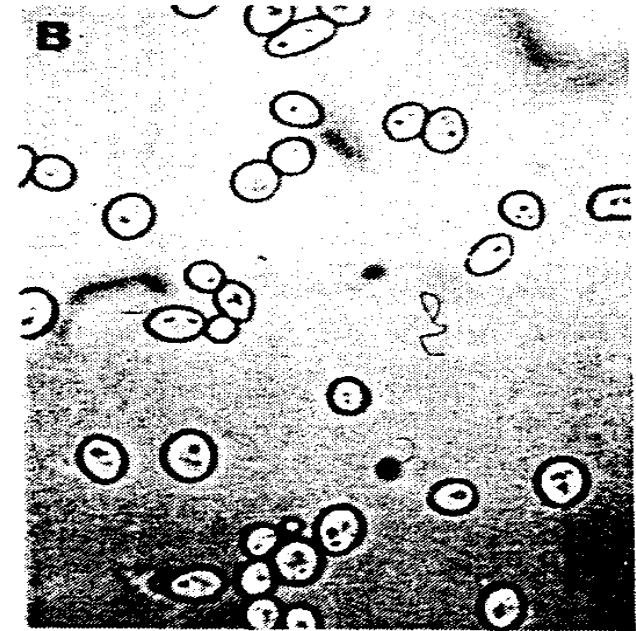
C.R. Murray, T. Barich and D. Taylor  
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# Photomicrograph of *Saccharomyces pastorianus* stained with Lugol's iodine



Fermentation Vessel  
(48 hrs)

(A) Yeast removed from a 16<sup>0</sup> P Lager fermentation 48 hrs after pitching.



Storage Tank  
(5 days)

(B) Yeast which has been stored aerobically at 6<sup>0</sup> 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?

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