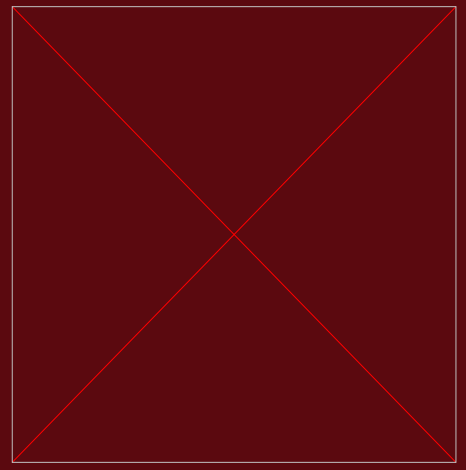
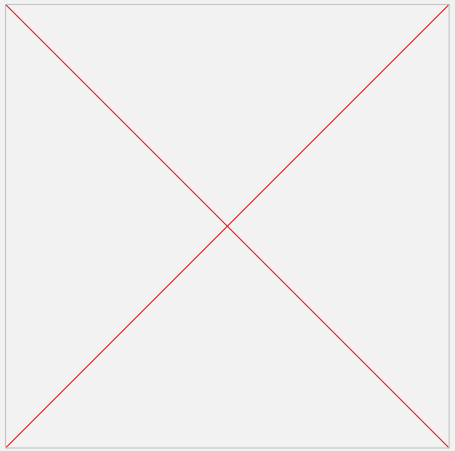


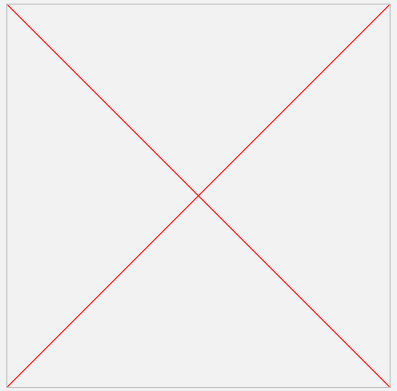
Every Gram Counts: Reduce COGS In Your Brewing Process

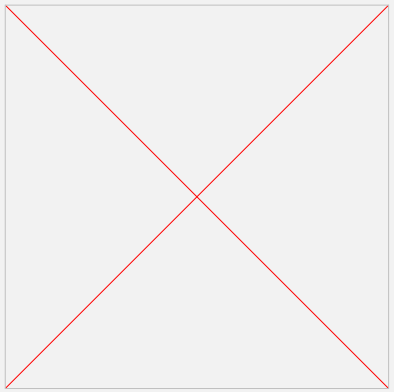
Eric Drost – Technical Sales Manger

Reducing your COGS means getting the most value out of your sunken costs:

time, raw materials, labor, and equipment.









ABOUT ME:

- Brewing Industry since 2016
  - VP of Sales, Hangar 24 Craft Brewery
  - Regional Sales Manager for large brewery ingredient company, SoCal
  - Sales Director for North America launch of an Irish yeast company

ABOUT ME:

- Travel the world with my family whenever we get a chance



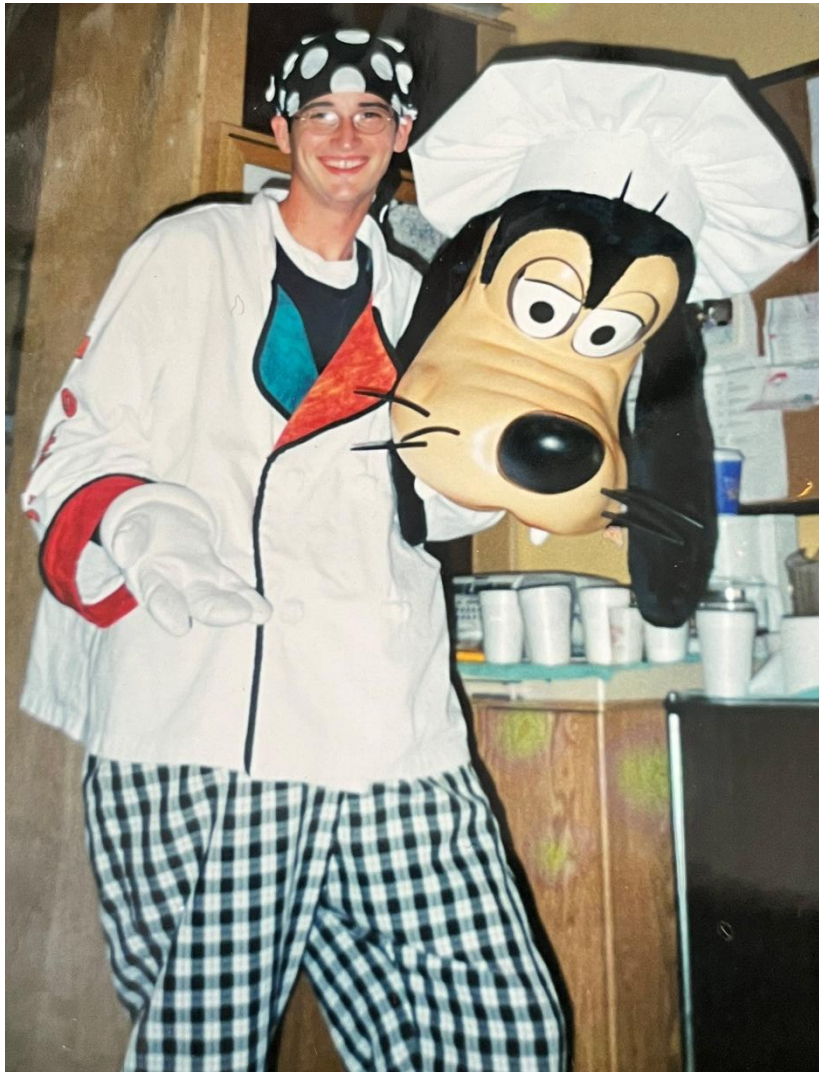
ABOUT ME:

- Little League Coach



ABOUT ME:

- Being Goofy (literally and figuratively)

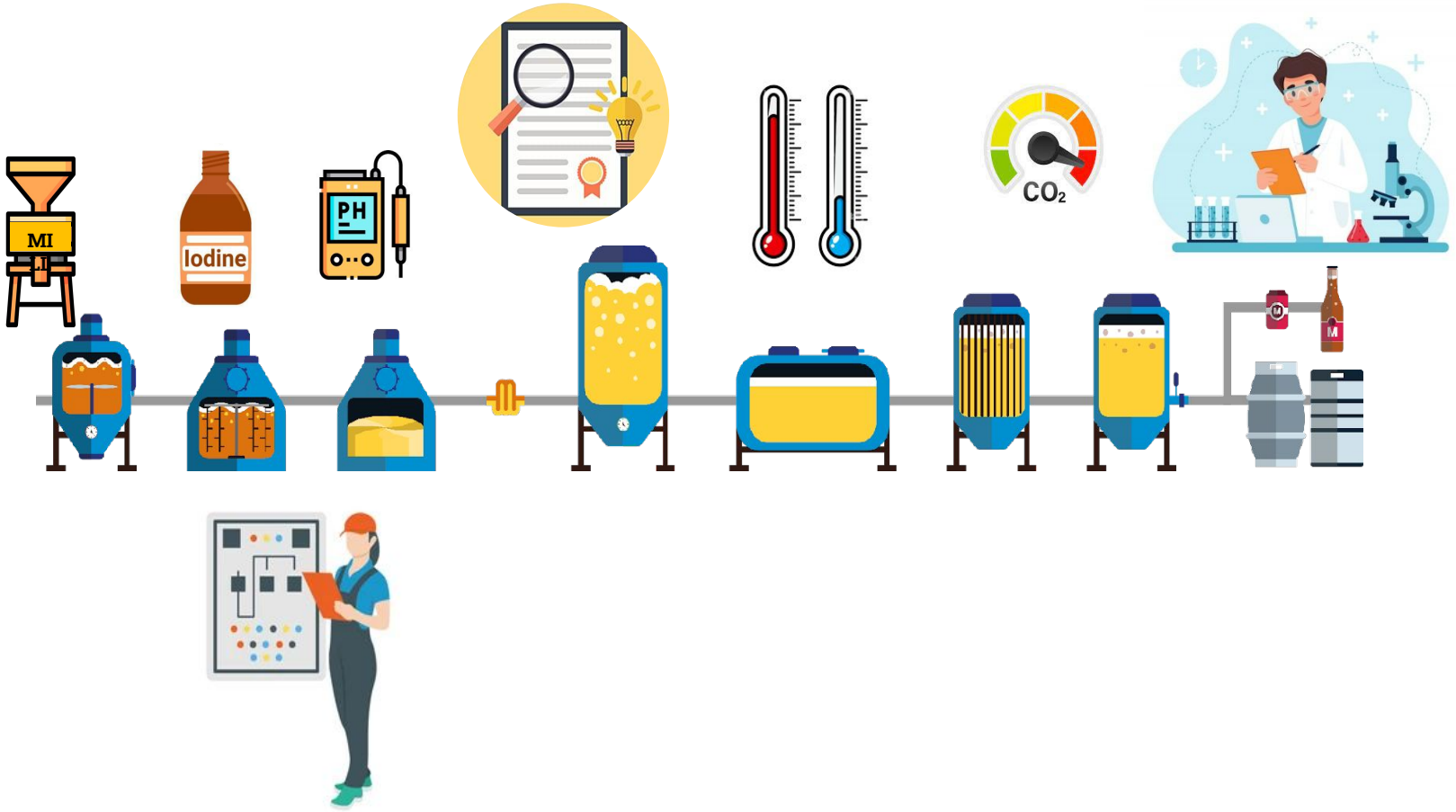


OUTLINE:

- The importance of measuring
- Helpful processing aids and enzymes
- Importance of the How to Guide
- Tips & Tricks – lab analysis



MEASURE!



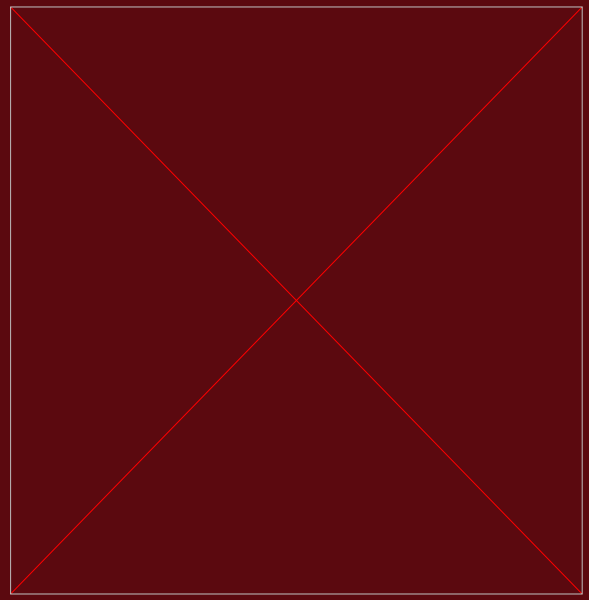
Know what you have

Measure as much as you can, as often as you can (and use it!)

Report

Analyze

PROCESS AIDS: FININGS & FOAM



FININGS OPTIONS

HOT SIDE

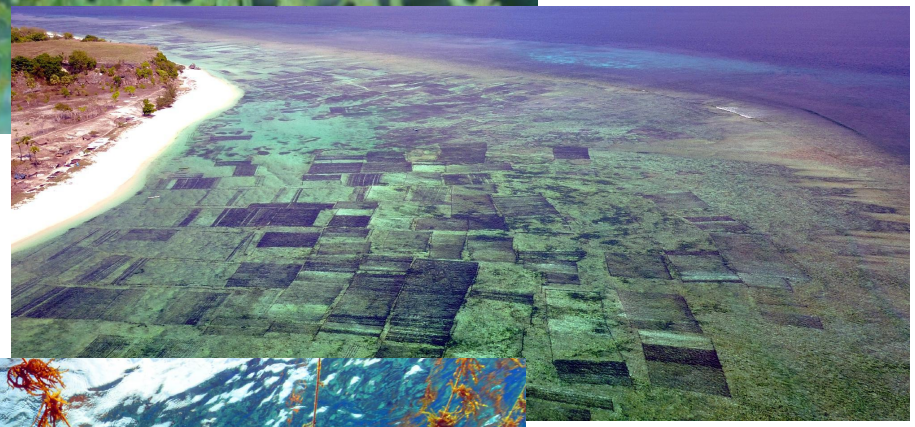
- Carrageenan
  - Irish Moss, Protofloc & Koppakleer, KICK, Whirlfloc, etc.
- Tannic Acid
  - Brewty, Brewtan B, etc.
- PVPP, PVPP+Carrageenan
  - Pristine PVPP, Polyclar Brewbrite, etc.

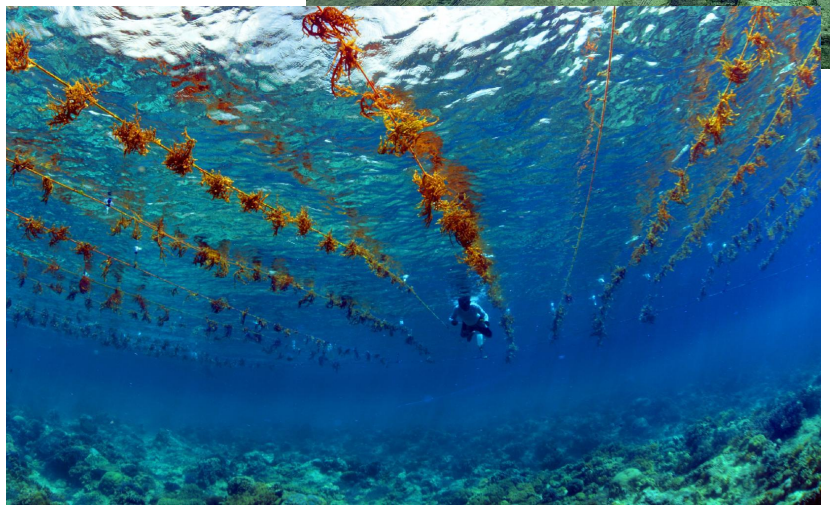
COLD SIDE

- Silica Finings
  - Super F, Biofine, Nalco, etc.
- PVPP
  - Pristine PVPP, Polyclar, etc.
- Isinglass
  - Caskleer, Finest Triple, Finest RFU, etc.
- Auxiliary Finings for protein haze
  - Finings Adjunct, Alginex, etc.
- Research into mushroom + corn

PROCESS AIDS: WORT CLARIFICATION







Granule



Tablets



- k-carrageenan (many brand names, but Protofloc is my favorite!)
- Natural product
- Derived from Seaweed
  - Removes excess protein as wort cools
  - Added end of boiling or whirlpool
  - Extremely low addition (1-4 g/hL)

PROCESS AIDS: WORT CLARIFICATION



- brighter wort, improved fermentation
- Increases wort clarification and faster filtration
- Reduce process time
- Improve beer stability and healthy yeast

WORT CLARIFICATION – OPTIMIZE IT

1. Measuring

Make up a solution of kettle finings by dissolving 1 g of carrageenan product in a liter of boiling water (this gives a 0.1% solution).

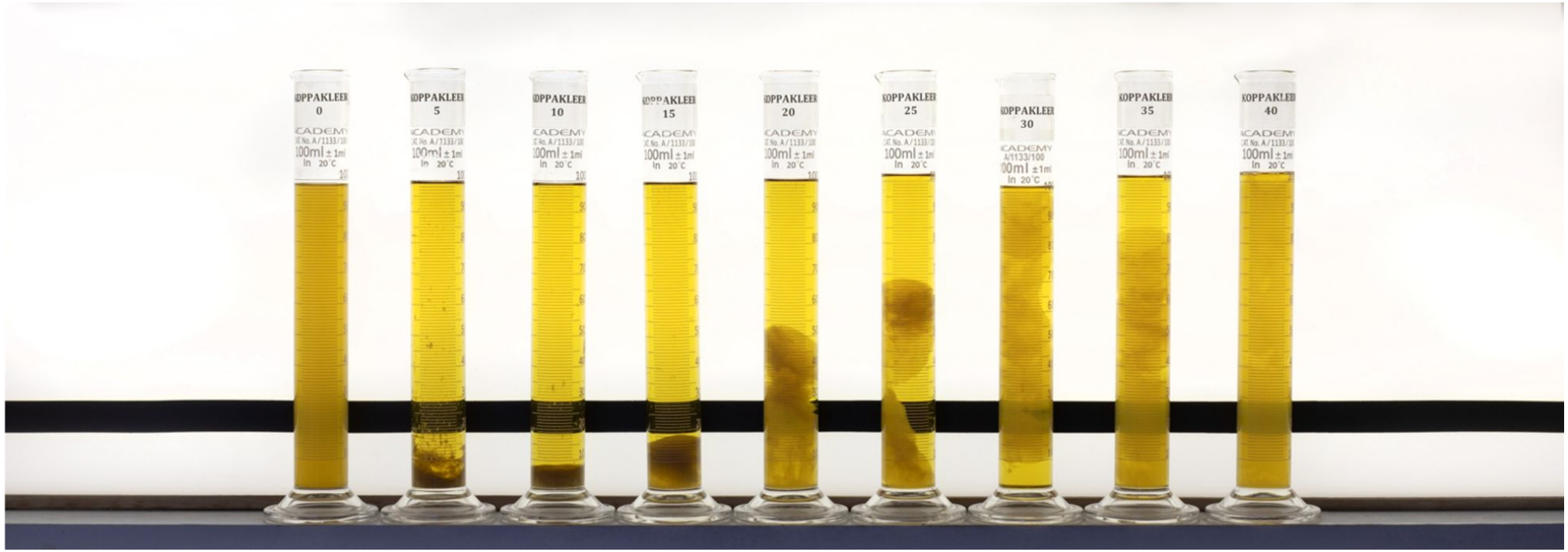
Label the 100 mL measuring cylinders in 5ppm (mg/L) increments, including a 0 ppm control up to 40 ppm (9 samples altogether).



WORT CLARIFICATION – OPTIMIZE IT

2. Add Finings

Add a range of finings rates to the 100 mL measuring cylinders using the pipette (a 10mL pipette works well for this), with 0.5 mL of kettle finings solution corresponding to 5 ppm.



WORT CLARIFICATION – OPTIMIZE IT

3. Take Samples & Record Clarity

Take a wort sample (approx 2 liters) 15 minutes before the end of the boil and just before the addition of kettle finings.

Fill the measuring cylinders with the hot wort to the 100 mL mark.

Record the wort clarity and appearance of the hot break.



WORT CLARIFICATION – OPTIMIZE IT

4. Cool & Allow To Stand

Cool by immersion in cold water in the bucket for 20 minutes.

Allow to settle for 2–4 hours and observe the appearance of the cold break, recording the wort clarity and cold break volume.

Allow to stand for a full 24 hours to get the final result.

Decide on the optimum rate of kettle finings addition for the beer in question, there should be bright clear wort and compact sediment.



HOT SIDE – CARRAGEENAN OPTIMIZATION



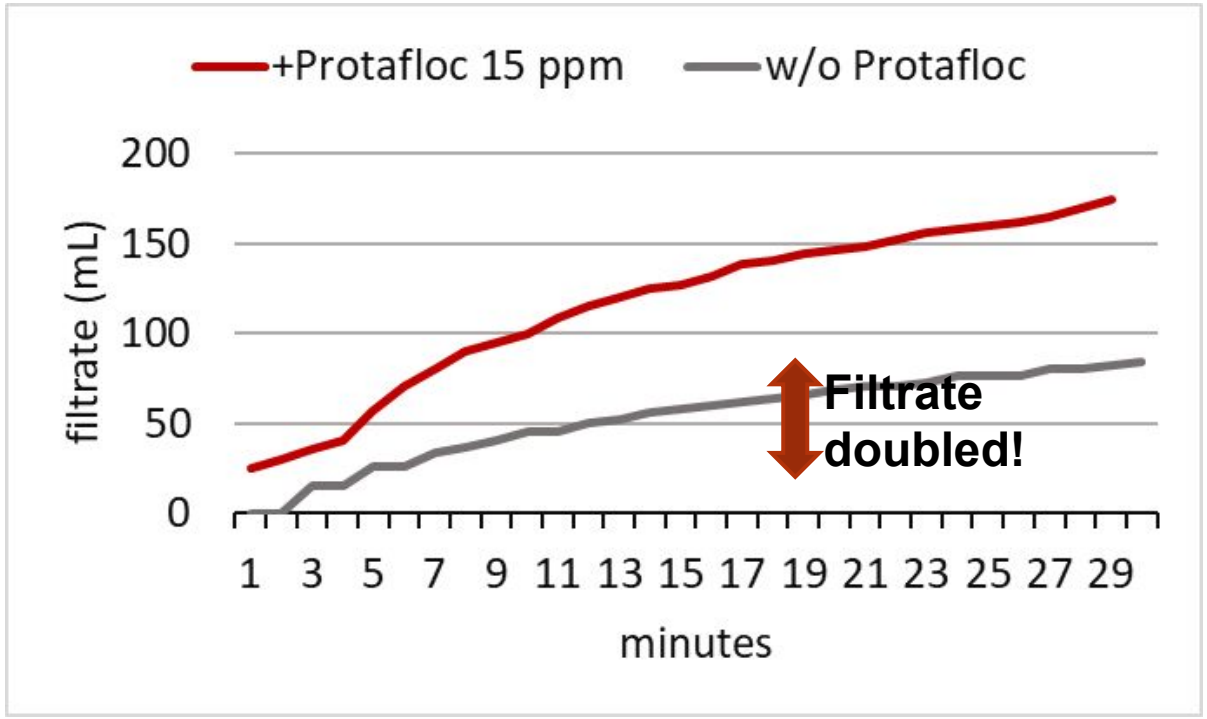
Beer clearing above the sediment means fining is working,

Compact layer at the bottom.
Dense, not fluffy.

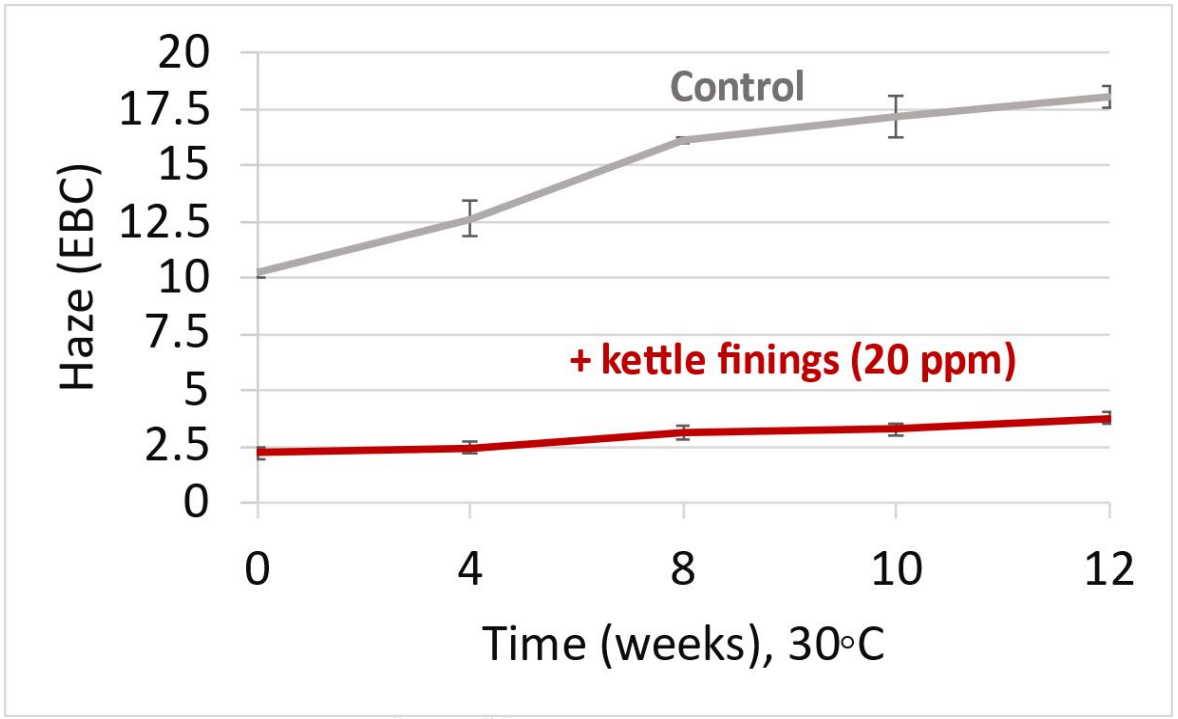
Bright beer.
Tight sediment.

WORT CLARIFICATION - BENEFITS





Beer filtration rate was significantly improved when Protafloc was added to the wort in the kettle.



Kettle fined beers measured haze levels <5 EBC even after 12 weeks kept at 30◦C

COLD SIDE – SILICA OPTIMIZATION

1. Preparation

Set up the glass bottles with the specified dose rates and clearly label the bottles.

2. Take Samples

Take a 2.5L sample of beer post fermentation and perform a yeast count (optional).



COLD SIDE – SILICA OPTIMIZATION

3. Add Finings

Add a range of finings rates to the beakers/bottles. Measure 500ml into each bottle and seal, invert three times to mix and refrigerate for 24 hours.

The recommendation for dose rates to optimise to are as follows:

Super F Dosage (pints per barrel)	Dosage mL/hL	Trial Dose 500 mL	Rate Guide
0	0	0	Control
0.17	60	0.3	Low
0.35	122	0.6	Low/Medium
0.45	157	0.8	Medium/High
0.62	217	1.1	High

COLD SIDE – SILICA OPTIMIZATION

4. Assess

Very carefully remove the beer from the fridge and set on a bench with a light source behind the samples.



COLD SIDE – SILICA OPTIMIZATION

5. Select Clarity

Select the rate which has the best clarity along with a compact sediment.

If you cannot measure haze it might be good to develop a grading system for your records e.g. A-F A=Brilliantly bright F= Very Turbid/Dull.

Yeast counts for the best sample can validate that the bulk of the yeast has been removed (optional).



OPTIMIZATION

EST. 1887 MURPHY & SON

OPTIMISATION

KETTLE FININGS

STEP BY STEP INSTRUCTIONS GUIDE

1. Measuring

Make up a solution of kettle finings by dissolving 1 g of carageenan product in a litre of boiling water (this gives a 0.1% solution).

Label the 100 mL measuring cylinders in 5ppm (mg/L) increments, including a 0 ppm control up to 40 ppm (9 samples altogether).

2. Add Finings

Add a range of finings rates to the 100 mL measuring cylinders using the 10 mL pipette, with 0.5 mL of kettle finings solution corresponding to 5 ppm.

3. Take Samples & Record Clarity

Take a wort sample (approx 2 litres) 15 minutes before the end of the boil and just before the addition of kettle finings.

Fill the measuring cylinders with the hot wort to the 100 mL mark.

Record the wort clarity and appearance of the hot break.

4. Cool & Allow To Stand

Cool by immersion in cold water in the bucket for 20 minutes.

Allow to settle for 2–4 hours and observe the appearance of the cold break, recording the wort clarity and cold break volume.

Allow to stand for a full 24 hours to get the final result.

Decide on the optimum rate of kettle finings addition for the beer in question, there should be bright clear wort and compact sediment.

EQUIPMENT

What You Need

- 9 x 100 mL Cylinders
- 1 x Jug
- 1 x Beaker
- Pipette and pipette bulb
- Bucket

SEDIMENT EXAMPLES



Control
Mini-sediment with hazy wort.

5 ppm
Sediment but slightly hazy beer.

20 ppm
Clear wort, packed sediment.

30 ppm
Very loose sediment, clear wort.

DID YOU KNOW

You can buy a Kettle Finings Optimisation kit from us at **www.brewing-products.com**

WANT TO KNOW MORE? GET IN TOUCH

If you would like to know more about what we do, head to **www.brewing-products.com** or to speak to our Technical Support Team, email **techsupport.US@murphyandson.com**

Murphy & Son Ltd | @murphys1887 | @MurphyAndSonLtd | Murphy & Son Ltd

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OPTIMISATION

SUPER F

STEP BY STEP INSTRUCTIONS GUIDE

We recently made our rapid-action, vegan fining Super F available to purchase without an optimisation by our laboratory! However, we still strongly recommend you carefully optimise before use! So, we thought it advantageous that we go through the basics of a successful Super F optimisation.

1. Preperation

Set up the glass bottles with the specified dose rates and clearly label the bottles.

2. Take Samples

Take a 2.5L sample of beer post fermentation and perform a yeast count.

3. Add Finings

Measure 500ml into each bottle and seal, invert three times to mix and refrigerate for 24 hours.

4. Assess

Very carefully remove the beer from the fridge and set on a bench with a light source behind the samples.

4. Select Clarity

Select the rate which has the best clarity along with a compact sediment. If you cannot measure haze it might be good to develop a grading system for your records e.g. A-F A=Brilliantly bright F= Very Turbid/Dull.

Yeast counts for the best sample can validate that the bulk of the yeast has been removed.

The recommendation for dose rates to optimise to are as follows:

Super F Dosage (pints per barrel)	Dosage mL/hL	Trial Dose 500 mL	Rate Guide
0	0	0	Control
0.17	60	0.3	Low
0.35	122	0.6	Low/Medium
0.45	157	0.8	Medium/High
0.62	217	1.1	High

EQUIPMENT

What You Need

- 3 L Measuring Jug
- 500 mL Measuring Jug
- Pipette with 0.1 mL graduations
- 5 x 500 mL glass bottles
- Refrigerator set to 4°C
- Microscope kit and Haemocytometer

SEDIMENT EXAMPLES



DID YOU KNOW

- When using Super F we always recommend that you optimise regularly.
- For the majority we've found the best results to be between 0-5°C and when the product is used in conjunction with optimised auxiliary finings and carrageenan use.
- Last but not least, your yeast count should be 1-8 million cells/ml of viable yeast.

WANT TO KNOW MORE? GET IN TOUCH

If you would like to know more about what we do, head to **murphyandson.co.uk** or to speak to our Technical Support Team, email **techsupport@murphyandson.co.uk**

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OPTIMISATION

CASK FININGS

STEP BY STEP INSTRUCTIONS GUIDE

1. Measuring

Take nine 100 mL volumetric cylinders (if using conical glassware, adjust addition rate for amount of beer used).

3. Mixing

Auxiliary Finings: To four 100 mL volumetric cylinders, add auxiliary finings at the rates below. Top up each of these glasses with un-fined beer.

GLASS 1A	GLASS 2A	GLASS 3A	GLASS 4A
0.17 mL	0.26 mL	0.35 mL	0.43 mL
(= ½ pint/barrel UK)	(= ¾ pint/barrel UK)	(= 1 pint/barrel UK)	(= 1 ¼ pints/barrel UK)

Isinglass Finings: To another four of these 100 mL volumetric cylinders, add ready-to-use Isinglass Finings at the below rates. Top up each of the glasses with un-fined beer.

GLASS 5I	GLASS 6I	GLASS 7I	GLASS 8I
0.35 mL	0.69 mL	1.0 mL	1.4 mL
(= 1 pint/barrel UK)	(= 2 pints/barrel UK)	(= 3 pints/barrel UK)	(= 4 pints/barrel UK)

Control: Fill the final glass with totally un-fined beer as a control.

3. Allow To Stand Overnight & Assess

Assess which rate of Isinglass addition (from glasses 5 to 8) has formed the best 'break'. Look for well-settled flocs which are not big and fluffy or floating near the surface.

Add this rate of Isinglass to the glass which contains the optimal rate of auxiliary finings (determined by clarity and sediment depth), invert to mix and leave overnight (i.e. if glass 6 works best add 0.69 mL to each of glasses 1 to 4).

Assess the clarity and depth of sediment of the samples, ideally against a fluorescent tube with a black pvc tape line. Invert again to mix and leave overnight again. Repeat this step 2-3 times to replicate the re-settling which occurs in trade.

Assess the clarity and depth of sediment of the samples. The ideal rate of use is the one with the brightest beer over the most compact sediment. The sediment should not be fluffy or disturb easily when the glass is gently moved.

EQUIPMENT

What You Need

- 9 x ½ pint glasses
- Your Isinglass / Auxiliary Finings of Choice
- 9 x Conical glassware (e.g. pilsner, flute, tulip, highball glasses)
  OR
  You can use 100mL volumetric cylinders from our Cask Finings optimisation kit available at **murphyandson.co.uk**

SEDIMENT EXAMPLES



Control
Hazy beer.

3.5 mL/L (1 pint/barrel UK)
Sediment but slightly hazy beer.

6.9 mL/L (2 pints/barrel UK)
Sediment but slightly hazy beer.

10.4 mL/L (3 pints/barrel UK) - optimum
Clear beer, packed sediment.

13.9 mL/L (4 pints/barrel UK)
Clear beer, packed sediment.

TOP TIP

We recommend reviewing your Finings additions with every batch you brew. Simply take a sample of your beer with a pint glass, add your optimised additions. If you notice any changes, consider performing another optimisation trial.

WANT TO KNOW MORE? GET IN TOUCH

If you would like to know more about what we do, head to **murphyandson.co.uk** or to speak to our Technical Support Team, email **techsupport@murphyandson.co.uk**

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TANK SPACE AND FOAM STABILITY

- Antifoam
- Thermo-stable silicone based emulsion
- Used in kettle, fermenter and even CIP
- Better beer foam (saves previous foam stabilizing proteins)

  = Pro-foam





TANK SPACE AND FOAM STABILITY

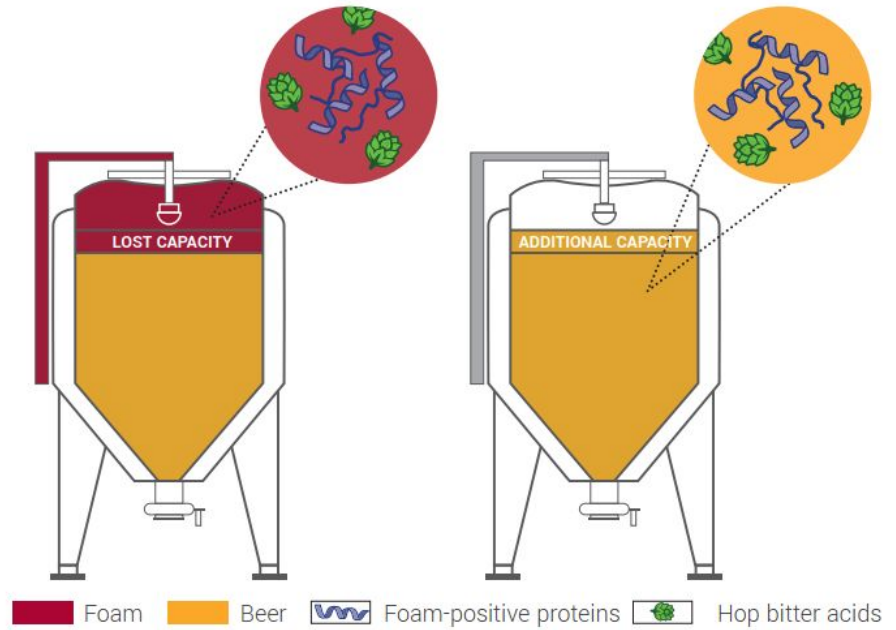
Antifoam:

- ✔ Improved hop utilization
- ✔ Improved vessel utilization (kettle and FV)
- ✔ Decrease Krausen = less mess for CIP
- ✔ **Increases brewing capacity up to 20%**

Myths to bust:

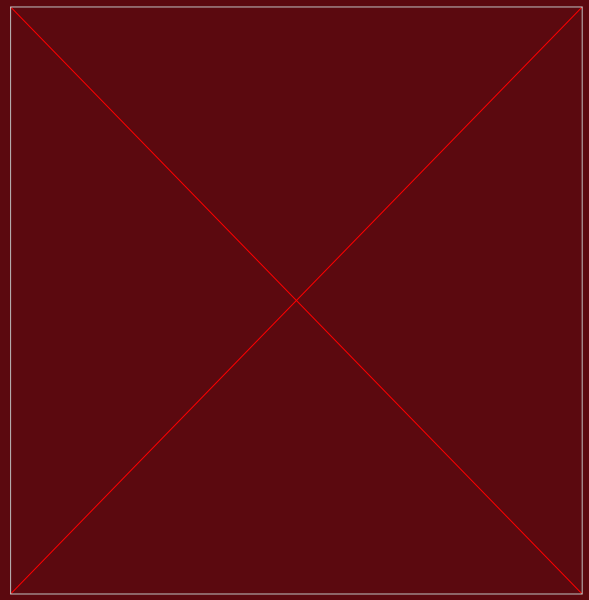
- ✔ No effects on beer foam*
- ✔ No effects on yeast*

*silicone based





ENZYMES



WHY USE ENZYMES?

- Produce novel products.
  - Enhance or replace endogenous enzymes
  - Add enzymes not normally found in the process
- Cost savings:
  - Raw Materials
  - Energy
  - Time / throughput
  - Create consistency between batches with inconsistent raw materials (Product loss, QA/QC)

Operation Performed	Enzyme used	Action of enzyme	Function
Decoction vessel / cereal cooker	α-amylase	Hydrolyzes starch	Liquefaction. Reduce viscosity.
	β-glucanase	Hydrolyzes glucans.	Aids downstream filtration.
Mashing	α-amylase	Hydrolyzes starch.	Malt improvement.
	Amyloglucosidase	The glucose content increases.	An increase in the % of fermentable sugar in “light” beer.
	Debranching enzyme	Hydrolyzes α-1,6 branch points of starch.	Secures maximum fermentability of the wort.
	Proteases	Increases soluble protein, and free amino- nitrogen.	Malt improvement. Improved yeast growth.
	β-glucanase	Hydrolyzes glucans.	Improves wort separation.
	Pentosanase / xylanase	Hydrolyzes pentosans of malt, barley, wheat.	Improves extraction and beer filtration.

Partial list of enzymes available – Mash / Adjuncts
From Biokemi, BioZoom, issue 522.

Operation Performed	Enzyme used	Action of enzyme	Function
Fermentation	Fungal α-amylase	Increases maltose and glucose con tent.	Increases % of fermentable sugar in “light” beer.
	β-glucanase	Hydrolyzes glucans.	Reduces viscosity and aids filtration
	α-acetolactate decarboxylase (ALDC)	Converts α-acetolactate to acetoin directly.	Decreases fermentation time by the avoiding formation of diacetyl.
	Amyloglucosidase	The glucose content increases.	An increase in the % of fermentable sugar in “light” beer.
	β-glucosidase	Hydrolyzes glycosidic bonds	Frees monoterpene alcohols (aromatics)
Conditioning tank	Protease	Modifies protein-polyphenolic com pounds.	Reduces the chill haze formed in beer.

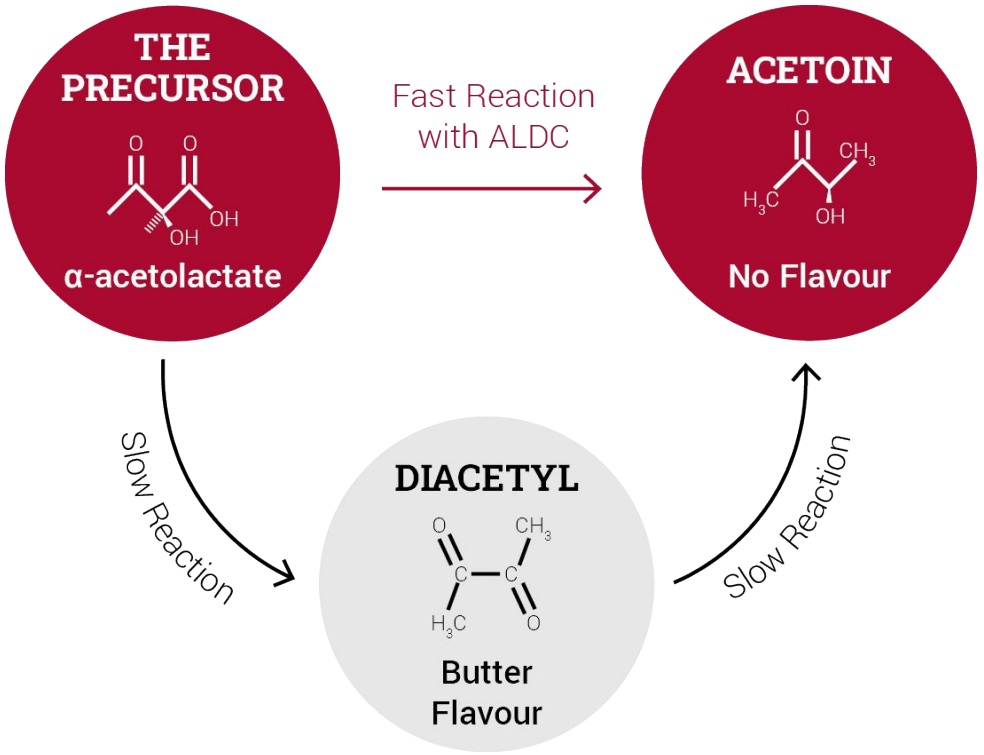
Partial list of enzymes available – Mash / Adjuncts
From Biokemi, BioZoom, issue 522.

REDUCING TIME IN TANK

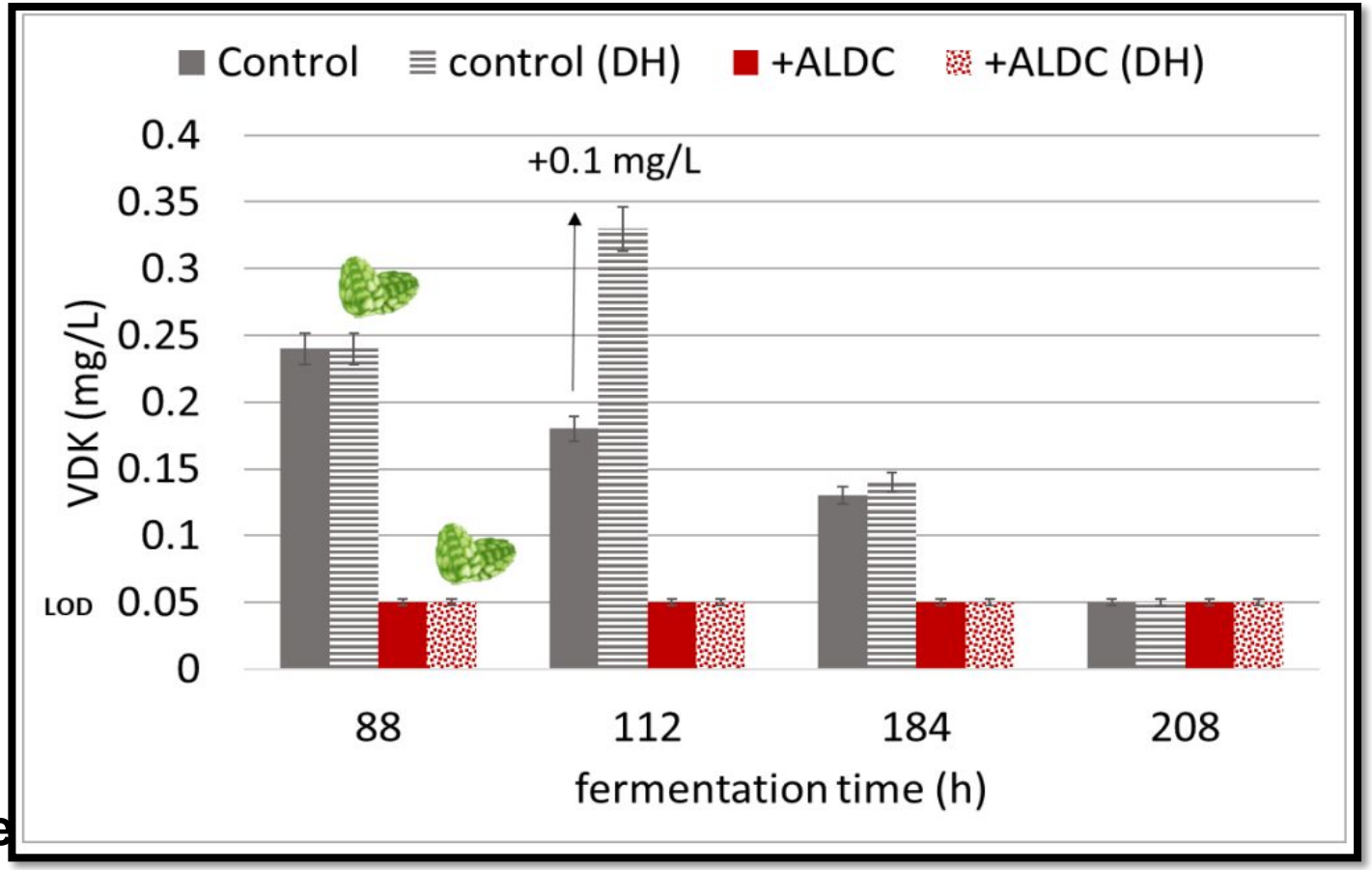
- Maximizing throughput:
  - Increases functional volume
  - Reduces staffing and utilities cost-per-batch

- How:
  - Enzymes (Hot and cold side)
  - High Gravity Brewing and then Dilution(even at small-scale!)

REDUCING TIME IN TANK: NEVER WORRY ABOUT DIACETYL



VDK determined in beers with or w/o dryhopping (DH) and the addition of ALDC



Reduce tank residency time. Reduce energy costs

ENZYMES - OPTIMIZATION

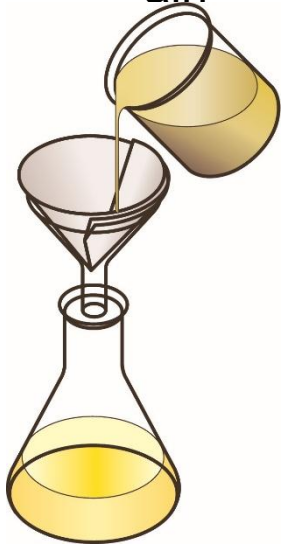
Processing aids can be used to trouble shoot problems

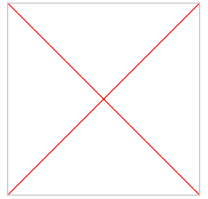
e.g. Poor run-off, long filtration times

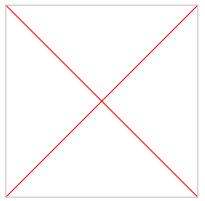
1. Measure 100 ml of beer into a 100 mL bottle
2. Add enzymes (one Control w/o enzyme)
3. Bottles in water bath (~65˚C, 1 hour)
4. Filter using Whatman Filter
5. Record time, volume filtered create graph



Contr ol | +Pap ain | +Amyle x5T | +Glucan ase







ENZYMES - OPTIMIZATION

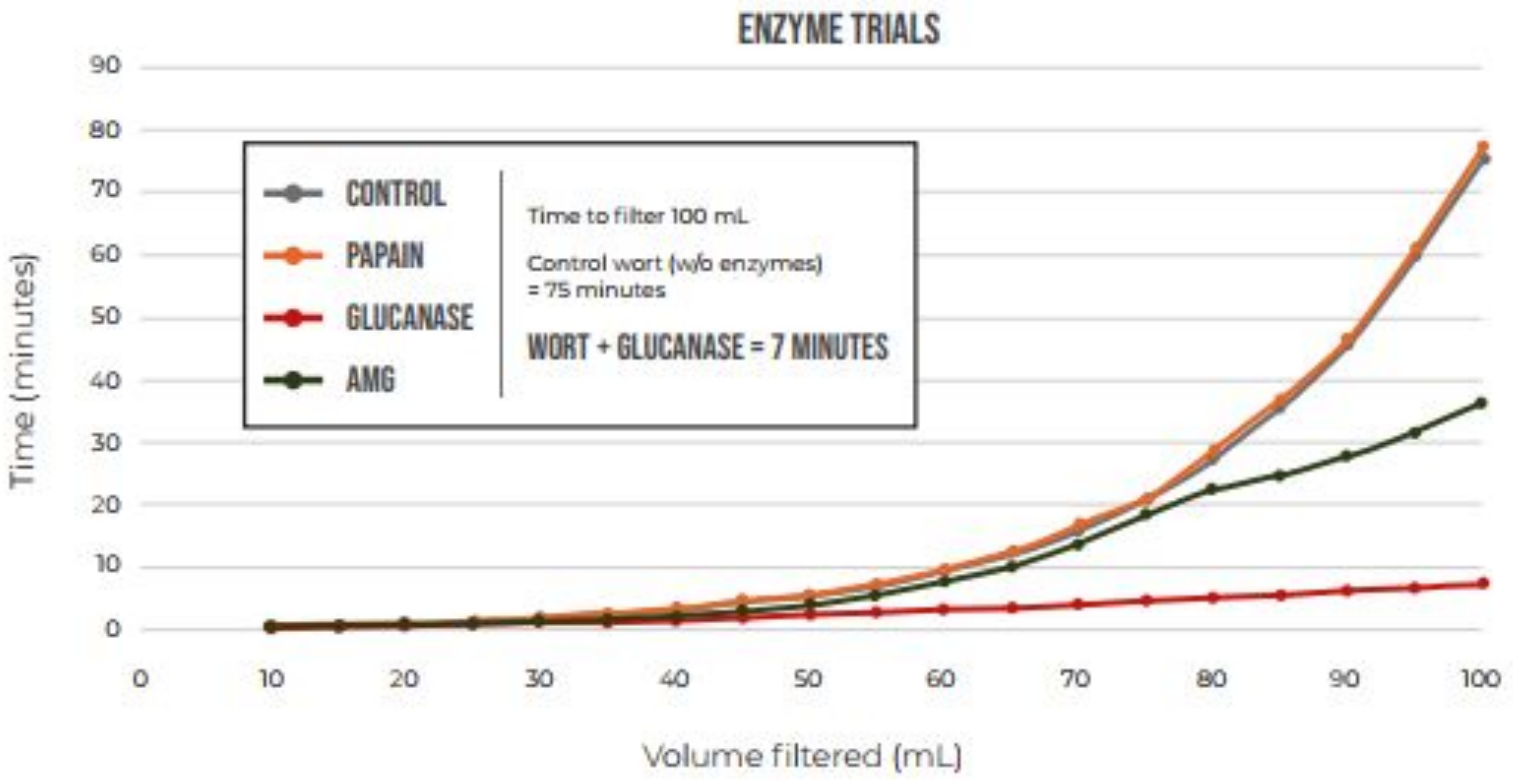


Figure: Comparison of filtration rate after the addition of enzymes (papain, glucanase or AMG300) compared to the control (w/o enzyme). Wort was collected after a 100 hL commercial brewing trial and filtration rate was determined immediately on site.

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CHEMISTRY TEST METHODS & TRIALS

ENZYME FILTERABILITY

STEP BY STEP INSTRUCTIONS GUIDE

1. Labelling

For this enzyme trial, you will need the following:

- 3 x 100 mL bottles for enzyme pre-dilution
- 4 x 200 mL glass bottles (3 for enzyme-treated samples and 1 as a control)

Table 1: Labelling Instructions

100 mL Bottle	200 mL Bottle
Diluted Papain (NDB3)	Beer/wort + Papain (NDB3)
Diluted Glucanase	Beer/wort + Glucanase
Diluted Amylex 5T	Beer/wort + Amylex 5T
/	Control

2. Control Sample

Measure out 200 mL of the beer sample using a measuring cylinder and pour into the glass bottle labelled Control. Seal up the bottle and place to one side.

3. Enzyme Dilution

Follow the instructions below to prepare the required enzyme concentrations using the table provided:

1. Add the specified volume of enzyme to a 100 mL bottle (as shown in Table 2).
2. Use a measuring cylinder to measure 100 mL of deionised water. Before adding the water, use a fresh pipette tip to remove an amount equal to the volume of enzyme added (e.g., 0.5 mL or 1.5 mL).
3. Add the adjusted volume of deionised water to the bottle containing the enzyme.
4. Ensure the solution is thoroughly mixed.

Table 2: Volume of enzyme required

Enzyme	Concentration (mg/L)	Volume of Enzyme (mL)
NDB3 100TU	50	0.5
Glucanase	150	1.5
Amylex 5T	50	0.5

SCOPE

This trial aims to establish a method for investigating the causes of filtration issues encountered by brewers. By using a range of enzymes, the study seeks to identify any that improve filtration rates, thereby providing insights into the potential underlying causes of the problem. The enzymes selected for this trial target specific haze-causing components in beer, as outlined below:

- Papain (NDB3): Breaks down proteins into smaller peptides.
- Glucanase: Facilitates the endo-hydrolysis of β-glucans.
- Amylex 5T: Breaks down starch into smaller, soluble sugars.

EQUIPMENT

- Whatman Grade 1 Filter Paper, 24 cm
- Funnel
- 100 mL Measuring Cylinder
- x3 100 mL bottles
- x4 200 mL glass bottles
- Stopwatch / Timer
- Gloves

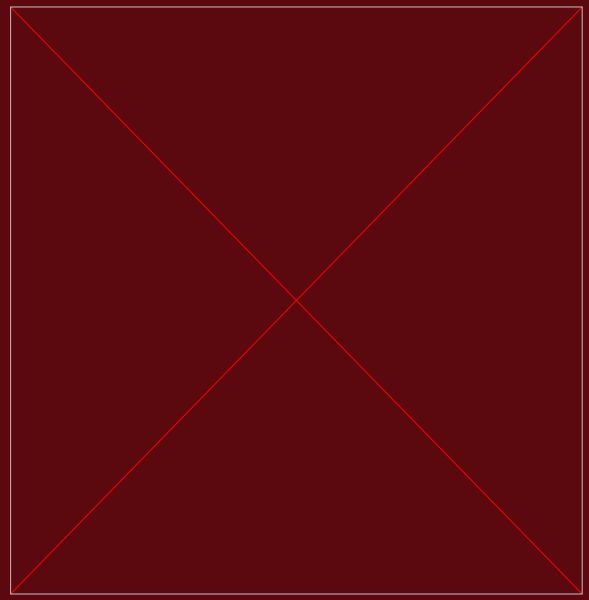
TIME

FILTER
1 - 4 hours

PREPARATION
1 hour

Need advice?
Speak to our technical support team, email techsupport@murphyandson.co.uk

INCREASING SHELF LIFE



INCREASE SHELF LIFE



The Problem:
- Off-flavours (e.g. cardboard, metallic) lead to complaints and returns
- Packaged beer may sit for months — quality must last
- Flavour faults = wasted product and damaged reputation

Impact:
- Lost sales and higher per-unit costs
- Limited shelf-life reduces market reach
- Increased packaging and resource waste

The Solution: MashLife!
- Improves flavour stability keeps beer tasting fresh longer
- Reduces waste, recalls, and markdowns
- Supports sustainability and customer satisfaction
. Increased ability to expand distribution footprint

Stable flavour = less waste, more happy drinkers



INCREASE SHELF LIFE

Iron Levels

Copper (pH Dependent)



Improved Oxidative Stability



EST. 1887 MURPHY & SON

ICBS International Centre for Brewing Science

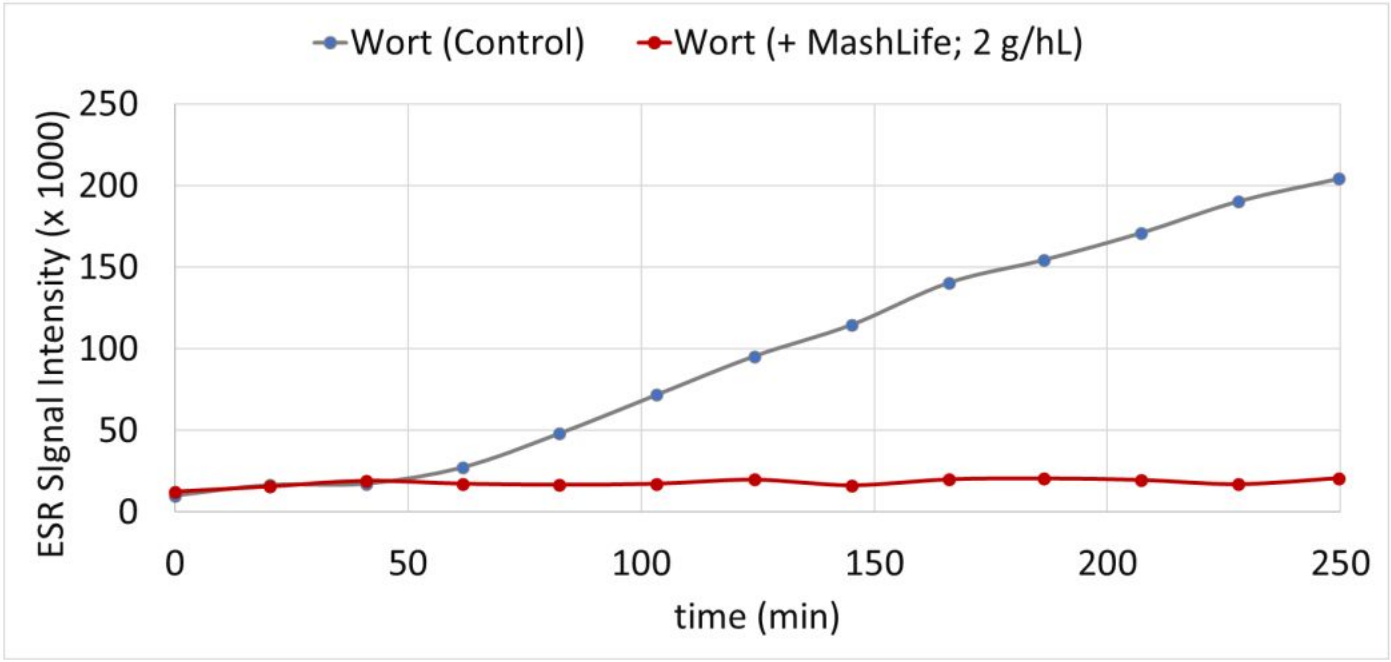
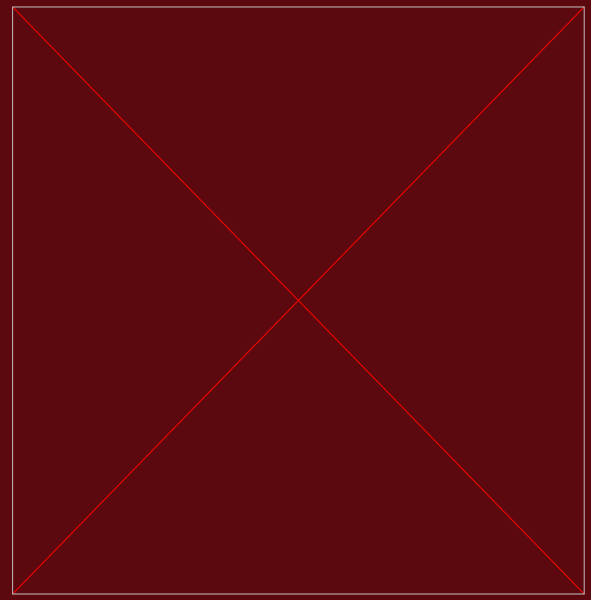


Fig.: Oxidative stability was assessed using Electron Spin Resonance (ESR) on clarified wort samples.

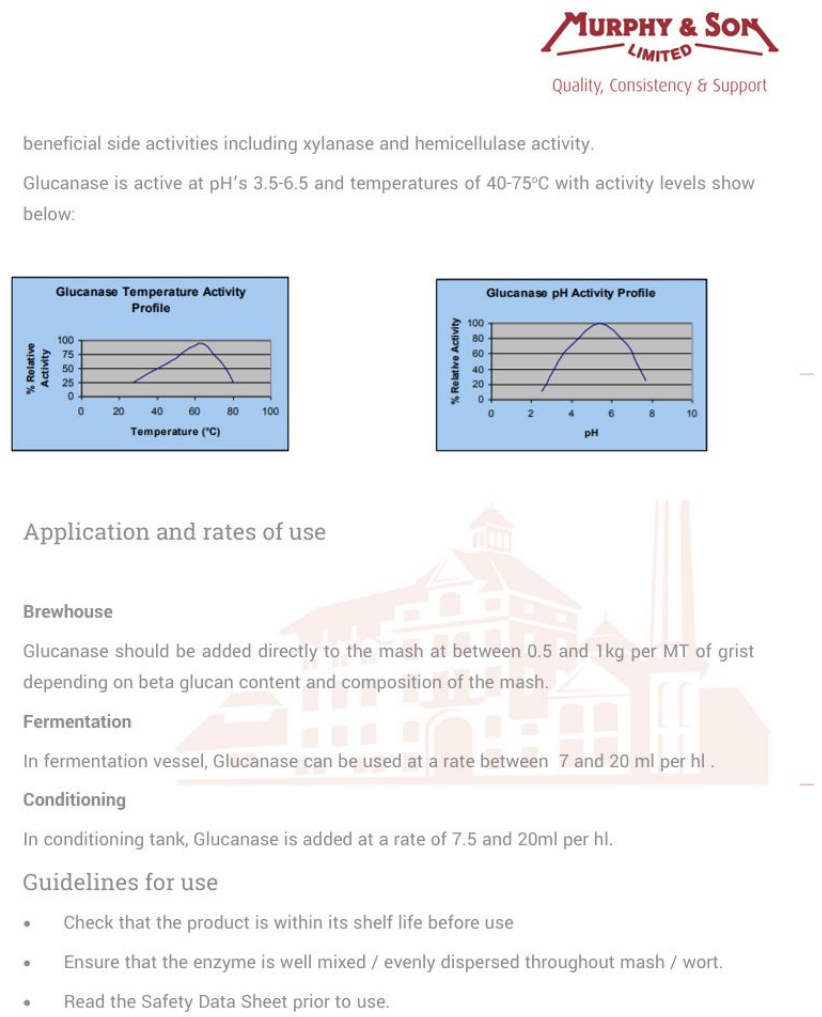
A FEW MORE WAYS TO REDUCE COGS



USE ALL OF THE INFORMATION PROVIDED, DON'T ASSUME

It is all in the TDS! Read the manual and/or contact technical!

- Typical problems
  1. Wrong product used for target outcome
  2. Product used at inappropriate conditions or time
  3. Used too much (or too little!)



MURPHY & SON LIMITED
Quality, Consistency & Support

beneficial side activities including xylanase and hemicellulase activity.

Glucanase is active at pH's 3.5-6.5 and temperatures of 40-75°C with activity levels show below:

Application and rates of use

Brewhouse

Glucanase should be added directly to the mash at between 0.5 and 1kg per MT of grist depending on beta glucan content and composition of the mash.

Fermentation

In fermentation vessel, Glucanase can be used at a rate between 7 and 20 ml per hl .

Conditioning

In conditioning tank, Glucanase is added at a rate of 7.5 and 20ml per hl.

Guidelines for use

- Check that the product is within its shelf life before use
- Ensure that the enzyme is well mixed / evenly dispersed throughout mash / wort.
- Read the Safety Data Sheet prior to use.

USE YOUR SUPPLIERS!

- Utilize your suppliers
  - Let them help you troubleshoot and find solutions.
  - Talk about what's new.
  - Work with the people you trust.
  - Accept samples (AND USE THEM!)in benchtop trials. You may find some huge savings by making small changes.
- Keep up to date on pricing
  - Tariffs and fuel force price restructuring.
  - Many products go by different names and you could be saving $$$.



Thank you



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