

[Fermentation Problems: Troubleshooting. Part 1: Problem: Slow start \(long-lag\) or Slow fermentation process](#)

BDAS, LLC has had several questions from brewers recently with stuck or slow fermentations. Here is a work in progress to try and resolve causes of these issues. In many ways it also relates to the Yeast Stress Factors and Stimulants Figure available upon request as a PDF or laminated sheet. But parameters can differ widely if involved in high gravity fermentations.

Problem: Slow start (long-lag) or slow fermentation process: - (1) Fault in Process

Fault in Process	Cause of problem	Remedy (I = immediate action possible) (LT/F – long term or future action)	Other Notes
	Insufficient aeration	(I) Rouse with sterile air/increase rousing or time of rousing.	See also Fault with wort (Below)
	Premature attemperation followed by pitching.	(I) Pitch in more yeast/Agitate/Heat up the attemperator – with hot water.	
	Fermenter (room) temperature too low.	(I) Heat up the attemperator – with hot water. (LT/F) Increase temperature of fermenter room.	Brewhouse/process issues here!

Problem: Slow start (long-lag) or slow fermentation process: - (2) Fault with Wort

Fault with Wort	Cause of problem	Remedy (I = immediate action possible) (LT/F –long term or future action)	Other Notes
	Temp. of wort at pitching – too low	(I) Pitch more yeast (LT/F) Monitor wort temperature/Adjust temp. of wort at pitching time.	Typical pitch rates vary for yeast, ale, lager and OG. Temp pitching 15.0-17 °C/Max temp. 20-22 °C.
	Oxygen content not optimal or in spec.	(I) Rouse (LT/F) Measure oxygen concentration/Adjust oxygenation. From 8-20 mg/L optimal depending on system/conditions and yeast. Oxygen is preferred to using air. Sufficient pressure and small bubbles required during delivery.	Sterols have been shown to have a positive effect and maybe reduce oxygen requirements. Fatty acids from spent grain also shown to be positive.
	Zinc content too low.	Measure zinc concentration. If deficient (depends on grist) add zinc salts or yeast nutrients containing zinc.	Conc. Zinc greater than 0.1 mg/L but less than 0.6 mg/L! [Maybe 0.25 mg/L] [Nutrients discussed at the end]^
	Calcium/Magnesium levels	Calcium and magnesium (and manganese) imp. For brewing and enzymes but high Ca:Mg ratios can be negative!	Calcium is not as important in fermentation itself except during later flocculation (discussed in a later segment) but 50-75 ppm would be a desirable level.
	FAN (Free amino nitrogen) concentration too low.	Measure FAN (should be at least 150 mg/L more for heavier Plato worts). Adjust mashing conditions and/or malt nitrogen specs. Check grist composition.	FAN measures soluble free nitrogen components for nutrition and is not to be confused with total protein which is measured via Kjeldahl methods.
	Wort clarity (too much or too little particulate hot break/cold break matter)	Check copper (wort) breaks. Adjust any finings as needed. Check wort separation facilities/equipment.	Different copper finings are available and need to be calibrated for amounts.
	pH and buffering capacity issues	Check wort pH (should be pH 5.0-5.5 for the boiled wort). Adjust water salts or acidification (test alkalinity). Check mashing conditions (mash thickness, mash and sparge temperatures). Test soluble nitrogen levels. Check grist composition.	Acidity and buffering capacity often measured in final beer by titration. All malt (domestic pilsner type) beers typically 0.2% acidity (as lactic acid) or 0.1% for adjunct beers. Craft beers will be higher than 0.2% depending on strength/style!

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[Fermentation Problems: Troubleshooting. Part 1 \(continued\)](#)

Problem: Slow start (long-lag) or slow fermentation process: - (3) Fault with Yeast

Fault with Yeast	Cause of problem	Remedy (I = immediate action possible) (LT/F –long term or future action)	Other Notes
	Low viability	(I) Pitch more yeast. (LT/F) Check yeast viability. Check for yeast contamination*. Improve yeast handling and storage conditions/protocols. Yeast strain considerations/replace yeast after defined cycles or if damaged/mutated/contaminated.	Yeast management and microbiological procedures, yeast counts and microscopy imp. here. Consistency is paramount.
	*High counts of contaminants (bacteria or wild yeast) and amorphous matter (oxalates-beer stone).	* Acid Wash Yeast. ** Replace with a fresh culture. [Note: we have seen a lot of issues with oxalates recently which provide a lot of sediment and crystalline matter. This is part of beer stone build up which (in tanks, lines, dead legs, spouts etc.) can allow bacteria and wild yeast to hide and be protected even from CIP cleaning. Microscopy of final beer can show this and it leads to the need to completely clean out the brewing systems.]	**Acid washing needs to be done under very careful and exacting conditions. It may be best to return to a fresh slant and restart propagation.
	Pitch rate too low?	(I) Pitch more yeast. (LT/F) Increase pitching rate – according to specifications/be consistent.	See above for pitch rates, etc.
	Imbalance of strains when using mixed strains.	Determine proportions and readjust the balance. Top up one strain. Replace culture.	Requires careful yeast management and microbiological and propagation systems when using mixed strains. For spontaneous type fermented beers the use of various microbes (yeast and bacteria) requires even more care and management.
	Yeast under stress?	Many factors influence and exert stresses on yeast. Other factors (nutrients, mineral ions, etc.) affect yeast too. Avoid contamination, acid build up (lactic and acetic), incorrect pH (optimal pH 3.0-4.0). Avoid high carbohydrate (not sugar) concentration and osmotic stress (if higher gravity fermentations are part of your ops). Avoid mycotoxins (from wet-harvest malts) and high sodium, iron and nitrate levels. *** Oxygen, sterol levels correct? FAN correct? (See Wort faults also above for advice here).	***See the BDAS, LLC Yeast Stress Factors and Stimulants Chart for further details. REQUEST A COPY TODAY! ^Yeast nutrients contain Zinc Mg, and sometimes Mn salts (usually sulfates) along with yeast extract thus providing other important minerals. Check the formula and addition rates!

Next: Stuck fermentations and failure to attenuate properly.



BDAS, LLC - Jan 30, 2012/Further work and parts in this series forthcoming.

This is a work in progress production (we welcome your input). Call or write us: (see www.alcbevtesting.com for contact details) A list of references, acknowledgments and links, etc. will appear with the last installment.