

Fermentation Control Techniques



- Dan Kutcher
- Jacques Guilloton

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Fermentation Control Techniques

- Agenda
 - What is fermentation?
 - Why fermentation control is important?
 - What can happen when you don't control fermentation.
 - Various ways to control temperature:
 - Use ambient temperature; or
 - Maintain constant temperature; or
 - Step up/down



What is Fermentation?



- Reproduction of yeast and conversion of sugars to alcohol and CO_2
- Yeast is responsible for the flavor profiles that we desire in beer (esters, phenols)



Why Control Fermentation?

“Controlling fermentation temperature is one of the best things you can do to make good beer!” - Dean Brundage

Consistency in temperature is crucial to consistently good results. Flavor profiles are more predictable with consistent control.



Keeping Yeast “Happy”

- Yeast are happiest at warmer temperatures
- We control temperature appropriate for yeast strain and desired flavor profiles
- Add oxygen at pitch
- Add nutrients
- Make a starter



Other Control Needs

- Adding Secondary Fermentation
 - Get the beer off the Trub
 - Aging
 - Lagering – Step down method (“Tasty’s method”)
- Easy cold crashing
- Secondary Pitching (“big” beers)



Why is Fermentation Temperature Control Important?

- Health of the yeast
- Maintaining integrity of flavors for the beer
 - Higher range of temperatures
 - Formation of “off” flavors – i.e. acetaldehyde, fruity esters, solvent-y and alcohol-y
 - stresses yeast (even 4° swing)
 - Causes proteins to unfold, damaging DNA
 - Lower range of temperatures
 - Slow fermentation
 - Incomplete fermentation/attenuation issues



Fermentation Temperature Control (Cont'd)

- Help control flavor profiles (ie Belgians and Saisons) - warmer than ambient
- Lagering – typically cooler than ambient
- Stepping fermentation temperatures
 - Start warmer to get yeast activated
 - Re-set controller to desired temperature
 - Enable diacetyl rest by stepping back up 1-2°F to complete fermentation



Warm or Cool or Cold?

- Depends on beer styles, yeast “demands”
 - Ales – 65-75° F
 - Saison – 64-80°F+, depending on yeast variety
 - Belgian – 64-75°F
 - Stout/Porter – 65-68°F
 - Pilsner/Lagers – 45-55°F down to 30°F
 - Lambic - ambient



How to Control Fermentation

- Lots of methods:
 - Make it warmer than ambient
 - Make it cooler than ambient
 - Make beer that MATCHES ambient
- How lucky are we? SD coastal ambient is mostly perfect for Ale fermentation all year long.



Fermentation Control Environments

- Converted Refrigerator
- Converted Freezer (chest or standup)
- Wine Cellars
- Closet “conversion”
- Home-made chamber
- Need a controller



Keeping it Cool

- Cold Water/Glycol Bath
- Wet T–Shirt with ice bath and fan
- Separate vessel with recirculating pump and ice bath/salt
- Refrigerator or freezer with temperature probe/controller



Make it warmer

- FermWrap
- Seed starting pad
- Brew Belt
- Space Heater
- Electric Blanket/Heating Pad
- Light bulb in paint can (for a chamber)
- Water bath with submersible fish tank heater and a circulator pump



Some “Gotchas”

- When measuring the temperature, measure on the fermentation vessel, not the environment (attach probe to carboy)
- Keep carboy off the bottom so airflow will cool ALL the beer and so there is no direct contact with cooling surface.
- Fermentation generates heat - control the fermentation environment – “Keep it happy!”



More Gotchas

- Control Humidity in your enclosed fermentation chamber



Avoids mildew/unwanted mold

Note raised floor



And MORE Gotchas

- Consider using a blowoff tube – here's why:



Using a Temperature Probe



Thermowell



Attaching a Temperature Probe



Elmer's Tac 'N Stik

Temperature Controllers

- Johnson Digital A419

\$80



- Johnson A19 Analog - \$65



- STC-1000 - \$15+



Controllers (cont'd)



- Control Products TC9102 Dual Stage programmable
- \$95
- Requires wiring (not included)



More Controllers



- OhmBrew Dual-Stage Programmable
- Removable storage allows for external program creation and data logging
- \$159



And even More controllers

- BrewPi



- Programmable and remotely configurable via web server (open source)
- Plus sensors
- \$145 +/-
- DIY version is less



Andy's Controls



Needs another beer

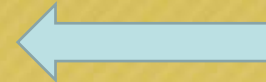
Using a Sanke for Fermenter

DIY Controller

- Dan Kutcher's DIY
– STC1000



Andy's warmer



Note
Thermowell for
probe



Dan's FermWrap



Chris Banker's Control System



Johnson
A419

Control
Products

Lots of
Medals!



DIY Chamber

- Ken Schwartz' "Son of Fermentation Chiller"



Jacques' Fermenter

Johnson
A419



\$50 Freezer,
Craigslist





Jim Bordier's

- Holy Cow! Danger, Jim Bordier!



Feeling flush?



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Summary

- The flavor of a beer will vary depending on fermentation temperature
- With proper controls, a brewer can select the desired flavor character by selecting a particular point within the “acceptable” fermentation range for a given yeast; and do so every time!
- **BREW ON!**



References

- SBE Presentation October, 2010 – The Science of malting, brewing and fermenting beer – Jason & Susan Cellitti
- Brew Your Own – byo.com – Controlling Fermentation Temperature: Techniques - John Stika, March/April, 2009
- Northern Brewer – Home Brewing 101
- The Complete Joy of Home Brewing, 3rd Ed., Charlie Papazian



More References

- Home Brew Talk forum
- The following web pages”
 - <http://homebrew.stackexchange.com/questions/1117/wiki-fermentation-temperature-control-methods>
 - <http://homebrew.stackexchange.com/questions/861/temperature-control-for-fermentation/865#865>
 - http://www.homebrewtalk.com/wiki/index.php/Primary_Fermentation#Fermentation_Temperature_Control
 - <http://www.reddit.com/r/homebrewing/comments/2x3wji>

