BJCP Study Group

March 26th, 2014

Market Garden Brewery

Brewing processes and their effects on the final product

"Haze: not just bad for the eyes …."

Thanks to our hosts!!!

Really, thank you Andy and MGB.

Processes to be considered:

- Sparging
- Boiling
- Chilling
- Fining
- Others that you have in mind????

Sparging

- Following mash
- Rinsing sugars from the grains
- Factors to consider:
  - Method
  - Temperature
  - pH
  - Gravity of the runnings

Sparging

- Reverse order – look at gravity of the runnings first
  - First runnings have most sugars, lowest pH. (Think barleywine or doppelbock.)
  - Later runnings have lower sugar (hence less buffering) and more contact with grain husks. (tannin extraction?)

Sparging

- pH concerns:
  - High pH tends to leach tannins from grain husks.
  - Can acidify sparge water or add extra buffering.
    - Acid: lactic or phosphoric
    - Buffering – add malt extract (!)

Sparging

- Temperature concerns:
  - High sparge water temp/grain bed temp makes wort less viscous, easier to run off.
  - High Sparge/grain bed temp can deactivate amylase enzymes, “set” the malt profile.
  - High Sparge/grain bed temp can hasten the leaching of tannins from the husks.
  - Conventional wisdom: 170-175F (IF you have good pH control).

Sparging

- Methods:
  - Fly sparging – add sparge water on top of grain bed at same rate as run off. (No need to spray. When to start?)
  - Batch sparging – run the grain bed dry (all first runnings to the kettle); then add sparge water to mash tun, stir, rest, run off again.
  - “Semi-batch sparge” – run off until a few inches below top of grain bed, then add all/most of sparge water, w/ continual runoff; aim for 20 minute runoff. (??!!)

Sparging

- Pros and cons of methods:
  - Fly sparging – traditional, used by all commercial breweries, possibly more efficiency. Slower, more prone to pH sensitivity.
  - Batch sparging – quicker, no extra equipment needed, less prone to pH problems. Maybe less efficiency?
  - “Semi-batch sparge” – Much quicker, less low-buffered water/husk contact. Less efficiency (but we’re homwbrewers, damn it!).

The boil

- Extracts, isomerizes and dissolves the hop alpha-acids.
- Stops enzymatic activity (“sets” malt profile).
- Kills bacteria, fungi, and wild yeast.
- Coagulates undesired proteins and polyphenols in the hot break (clarity, fewer off-flavors).
- Evaporates undesirable harsh hop oils, sulfur compounds, ketones, and esters. (60-100 min?)

  (“half-life” of SMM is 40 min.)
- Promotes the formation of melanoidins and caramelizes some of the wort sugars (mixed blessing)
- Evaporates water vapor, condensing the wort to the proper volume and gravity

Chilling

- Gets wort to pitching temperature.
- Rapid chilling is the key:
  - Gets wort through the lactobacillus or random bacteria temperature range quickly (increasing odds of clean fermentation).
  - Produces cold break (enhancing clarity).
    - Remove the cold break? Debatable…

Chilling – methods

- Immersion chiller
  - Simple, no sanitation issues
  - Limited to 5-10 gallons?
  - Can be augmented by icewater easily
- Counterflow/plate chiller
  - Unlimited capacity
  - More sanitation concerns
  - Harder to balance icewater additions

Finings (for clarity)

- Copper finings (Irish moss, Whirlfloc)
  - Simple, no sanitation issues
  - Help coagulation of protein/polyphenol complexes, adds to hot break (No debate about hot break!)
  - Necessary with modern low-protein malts?
- Post-fermentation finings (Irish moss, gelatin, PVPP, isinglass)
  - Gelatin helps remove yeast (charge…..)
  - PVPP (Polyclar, etc.) works for polyphenols, tannins
  - Starch haze? Forget it!

Summary

- Watch temperature, pH when sparging, avoid “oversparging’ to reduce leaching tannins (avoid astringency, “colloidal instability”).
- Boil vigorously (for lots of reasons, including clarity/stability from substantial hot break).
- Chill quickly for sanitation reasons and more clarity/stability from substantial cold break.
- Finings (copper or post-fermenter) can help with clarity/stability.