Lautering Basics

Kunming Homebrewing Society November 2014

sugars vs. tanins

Milled grain —> Mash —> **Sparge** —> Boil —> Ferment —> Drink!

So you've just finished mashing your grain and you have a pot full of delicious-smelling malt-porridge. But you can't make beer from malt-porridge… The residual grains are now spent and hopefully sugarless - all the sugar is on the outside, coating the grains and disolved in the wort. Lautering is the process of separating or filtering the mash so you're left with just the wort. There are usually 3 (non-separate) parts to the process:

Mashout

First raise the temperature of the mash to 77 degrees in order to stop the enzymes from continuing to convert starches in the grains into sugars (it's more difficult to filter out the sugars while you're producing more…). It also makes the mash more fluid so it's easier to filter. Mashout is done by adding heat or adding hot water (i.e. during sparging). It's necessary if you have a thick mash (less than 3L water/KG of grain) or if you are using lots (>25%) of wheat or oats - these make the mash thick and sticky and can lead to a "stuck sparge". It's **important** not to mashout above 80 degrees as this may extract tanins from the grain husks, giving the eventual beer a bitter or astringent off-flavour.

Recirculation

Before you draw wort from your mash, the first litre or so may be cloudy with grain dust, which you don't want in your boil kettle or your finished beer. You should gently pour this back onto the top of the grain bed, carefully so as not to disturb it; keep pouring cloudy wort back into the top until it runs clear. We want to use the grain bed as a filter for the wort being drawn off. This process is also called **vorlauf**. If your grain bed gets disturbed, you may need to do this again if the wort starts coming out cloudy again.

Sparging

This is a delicate step which, like mashing, requires a certain temperature and pH range. Essentially, the process involves adding hot water to the mash and drawing out the wort. Usually the amount of water used in sparging is about 1.5x the amount used for mashing. There are handy tools online for calculating the amount of mash and sparge water needed (e.g. http://www.brew365.com/mash_sparge_water_calculator.php).

Sparging should be done **slowly** - anywhere from 0.5 to 2.5 hours - in order to get the best extraction of sugars. That's why "sparge" means "sprinkle". There are generally 3

sparging methods:

English

The wort is completely drained from the mash then the sparge water is added. The mash is then held at 76 degrees to stop saccharification for a while before being drained again. The second draining will be lighter and could even be used to make a lighter-bodied beer, or it can be mixed back in with the first. Not often used by homebrewers.

Batch / US

The full volume of sparge water is added to the mash and the wort slowly drained off after the grain bed has settled. It's different from the English method because the mash isn't held for very long at a certain temperature. Sometimes the batch is done in… batches. This method is easy and popular with homebrewers but it's slightly less efficient (by about 3-6%).

Fly / Continuous / German

First the wort is recirculated and drained until about 3cm of wort remains above the grain bed. Sparge water is gently added or sprinkled over the grain bed while the wort is drained at the same rate. The idea is to slowly replace the wort with water and keep the water at the same level above the grain bed. This is done continuously until either enough wort has been collected to meet the required boil volume, or if the gravity drops too low, whichever comes first. This method requires the most attention/effort, but is the most efficient. Used by both homebrewers and commercial breweries alike.

REMEMBER: Your ideal mash pH is about 5.1 - 5.4 so adding water will increase it (especially when you're using lighter grains with less pH buffering capacity), risking the extraction of tanins from the grain husks. That means that during sparging the top of your mash is going to have a higher pH than the bottom, and the pH of the wort you're drawing off will gradually increase. When the gravity of the

wort you're drawing gets down to about 1.019, you can be sure that the pH is closer to 7 and the wort will probably contain more tanins… so a good time to stop.

AND ANOTHER THING: Don't squash or move the grain bed or squeeze the bag if you're using the "boil in the bag" method - squashing will release those nasty tanins and disturbing the grain bed reduces its filtering ability.

What equipment do you need?

- A filter bag OR a false bottom for your mash/lauter tun OR a manifold in your mash tun to separate the grain from the wort
- A clear tube or jug for monitoring/collecting wort
- A thin tube for siphoning hot water onto the mash
- *(optional)* A sparge arm for sprinkling water over the grain bed

What can go wrong and how to fix it?

- **Residual grains** - f you have residual grains in your boil then you may continue to extract tannins. If grains end up in your fermenter/bottles/kegs then your fermentation may be unpredictable. Find a way to filter properly the wort coming out of your mash/lauter tun by using a false bottom, manifold, filter bag, or a combination.
- **Stuck sparge** - if you're using sticky grains like wheat or oats then they may clog up the grain bed and prevent the wort from filtering out. A solution is to add more water to try and make the grain bed more liquid or add rice hulls to the mash - they don't impact flavour but will help break up the grain bed.
- **Channeling** - sometimes the water you add will find its way through "channels" in the grain bed, leading to less efficiency because you're only washing the sugars from the grains around those channels. The solution is so sprinkle or pour your sparge water all over your grain bed. If you need to disturb the grain bed, remember to let it settle out before you continue sparging and repeat recirculation until the wort runs clear.