Improving Brewhouse Efficiency

All grains in a beer recipe have a potential ideal yield, usually expressed as the find grain dry yield or potential. The fine grain dry yield is typically measured in laboratory conditions by powdering the grain and measuring the maximum possible extract. In the real world, only a fraction of the ideal yield is achieved due to mash inefficiencies, sparging limitations, deadspace and trub losses.

The overall percentage of the potential grain sugars absorbed into the finished wort is called the brewhouse efficiency. Achieving higher efficiency on a consistent basis lets you use less grains to achieve a target original gravity.

All grain brewers, particularly those who are inexperienced, often have low efficiency numbers. Let's look at five ways to increase your efficiency number:

1. Improve the Milling of your Grains

The crush of your grains makes a significant difference in the efficiency of your mash and sparge. Grains should be finely crushed, but the milling should leave the hulls largely intact to act as a filter bed. A dual roller mill such as the Barley Crusher is ideal for achieving this. Note that if you crush your grains too finely you will plug up your filter bed resulting in a "stuck mash". If you get a stuck mash, your filter bed will clog up and the wort will stop flowing.

2. Mash Out or Sparge with Hot Water

Hot water during the mash out and sparge helps the sticky wort flow more freely. Ideally you would like to raise the mash temperature to about 168F and then use 168F water to sparge. A mash out infusion addition can be used to help raise the temperature of your mash as you sparge.

3. Sparge Slowly

Most beginners attempt to sparge their mash much too quickly. Sparging too quickly leaves insufficient time for the hot water to extract the sugars in the grain bed. Limit the flow out of your mash tun to just above a trickle. It should take 60 minutes to fully sparge a 5 gallon all grain batch (about 6 gallons of wort = 1 gallon every 10 minutes). Technically you can get away with sparging for 30 minutes, but we're talking about maximum efficiency. What's another 30 minutes?

4. Minimize Losses in your System

Losses anywhere in your brewing system, including deadspace in the mash tun, transfer lines, pumps, and trub at the end of the mash result in lost wort. The lost wort takes sugars with it, reducing your overall brewhouse efficiency. Use a properly sized mash tun, and work to eliminate deadspace in the system.

5. Pick a Properly Designed Mash Tun

The design of your mash tun and false bottom or screen can have a huge effect on the efficiency of the mash process. A round, cylindrical mash tun is generally considered best, as it leaves the depth of the grain bed about equal to its width. This is one reason cylindrical water coolers are popular.

The false bottom ideally will cover the entire bottom of the mash tun but have minimal dead space underneath it. This will provide an even flow across the entire grain bed giving better efficiency.