Batch-Sparging

After a 2-year hiatus from the hobby, I recently got back into homebrewing. I had decided that I would give up my RIMS system and return to a simpler, faster and easier-to-clean system. I tried a few batches using a stainless steel keg as a mash tun but soon discovered that it lost heat too fast. I decided that since my preference was for British Ales, a single infusion system would be best so I constructed a basic mash tun from a 54-qt cooler.

My first brewing session with the new mash tun was going along very well but when it came time to sparge, I realized that I hadn't fabricated any device to sprinkle the sparge water over the grain bed. I suppose that I could have simply used a pie tin or plate to trickle the water over, but instead I decided to try a method I had recently read about on the Internet. That method, known as "batch-sparging", turned out to be much simpler and faster than traditional fly sparging.

The Problem

With fly-sparging, also known as continuous sparging, the goal is to match the input of sparge water from the hot liquor tank to the runoff flowing into the kettle in order to maintain a constant volume of water in the mash tun. As clear hot liquor slowly flows into the mash tun it dissolves more extract which is then flushed into the kettle. This presents several problems for the homebrewer.

First of all, unless the brewer has installed some sort of float valve, sparge inflow/outflow rates must be carefully monitored to ensure that the grain bed is not run dry, or the mash tun overflowed.

Secondly, it is generally accepted that a slower runoff produces higher yields. One reason for this is that runoffs that are too rapid can cause channeling as fresh sparge water bypasses the grain and flows almost directly into the mash tun runoff. Another reason is that the sparge water may need to stay in contact with the grain for a length of time in order to dissolve the sugar sufficiently.

Finally, many brewers feel that it is necessary to continuously monitor the runoff gravity and cut off the sparge when it has reached 1.010 to avoid leaching of tannins and other undesirable grain compounds. I'm not sure of the origins of this particular gravity, but 1.010 seems to be generally accepted. This can also complicate the calculations of how much sparge water to heat, as well as determining when to shut off the hot liquor flow while continuing to drain the runoff. In addition to specific gravity, wort pH is another aspect that many brewers like to monitor and control.

The Solution

Batch-sparging solves all of those problems. With batch-sparging, you first completely drain the mash tun into the kettle. This is similar to methods employed by most homebrewers when making high gravity worts. However, once the first runnings are collected, an additional amount of hot liquor is infused into the mash tun, stirred to help dissolve more extract and then drained again into the kettle.

The result is a process that is much simpler. You no longer have to match the inflow to outflow because there is no inflow. You simply open up the valve of your tun and let the runoff flow at full speed. During my last brewing session it took me about 15 minutes to completely runoff 11 gallons!

Channeling and pocket stagnation are no longer issues because the entire volume of water in the tun at a given time will tend to have the same amount of extract dissolved into it. No matter

where the water is flowing from it has the same uniformly distributed extract as any other part of the tun. This also means that mash tun design as not as critical as it is with continuous sparging.

Frequent monitoring of runoff specific gravity is also eliminated since gravity remains constant throughout each phase of the batch-sparge process (since you're not continuously diluting with water it doesn't change). It's easy to design a process in which the second half of the sparge has a specific gravity in excess of 1.020, even for low gravity ales!

It was also noted that some brewers like to monitor and control the mash pH by either adding acid or gypsum to the sparge water. This can be problematic for several reasons. First of all, acidifying the sparge water will have an overall effect of the mash pH, but that effect is difficult to quantify until the sparge water is actually infused with the mash and measured. Furthermore, as the sparge water rinses the extract from the mash tun, the pH will be constantly changing. With batch-sparging, acid or gypsum (if appropriate for the recipe) can be added directly to the mash tun. Since no continuous dilution takes place, the pH remains relatively constant.

The tradeoff

There had to be a downside to this method or else all brewers would employ it, and of course there is. Batch-sparging produces poorer extraction rates than continuous sparging. But it's not as bad as you might imagine. During my last batch (an Ordinary Bitter - OG 1.040) I got an extract efficiency of approximately 80%. This compares to about 88% on average for my continuous sparging technique. To correct for the decrease in efficiency I find that I need to add an addition 1 to 2 pounds of grain per 10-gallon batch. I feel that the reduced time and simpler process is well worth the expense of a few extra pounds of grain.

The Process

Much of what I've learned about the technical aspects of batch-sparging comes from Ken Schwartz's site at, http://home.elp.rr.com/brewbeer/files/nbsparge.html. It has everything you want to know about batch-sparging and no-sparging techniques, plus lots you may not want to know. To simplify the recipe formulation I took his formulas and built an Excel spreadsheet. This was before I realized that he also had a spreadsheet format available. Mine is at http://bayareamashers.org/content/maindocs/BatchSparge.xls and his is http://home.elp.rr.com/brewbeer/files/nbsparge.xls.

One important thing to note is that extraction efficiency will be optimized if the two runoff volumes are equal. For example, if you are going to runoff a total of 11 gallons, then the first runoff volume will be 5.5 gallons, which will also be equal to the second runoff volume. This makes it easy to calculate the total amount of water to add for each of the two runoff phases. The total amount of water added to the mash tun for the first phase will be greater than the second phase because you need to account for water retained by the grains.

The mashing process starts out the same as it does for a continuous sparge batch. That is, enough hot water is infused with grain to achieve the desired mash thickness for the particular recipe. The difference comes when initiating the sparge. At that point, an additional volume of hot water is infused into the mash tun in order to bring the total volume to ½ of the total expected runoff, plus additional water to compensate for what is retained by the grain. The mash is then thoroughly mixed to dissolve as much extract as possible and uniformly distribute it. The runoff is recirculated until clear and then allowed to drain into the kettle. Once the first runnings are completely drained, the second volume of water is infused into the tun and the mash stirred again. The runoff is then recirculated until clear and then run into the kettle.

The spreadsheets mentioned above will make it easy to calculate how much water to add at each step, as well as predict the runoff gravity during each runoff phase. Ken mentions a target gravity of 1.019 that you want to stay above for the second phase, but I am not sure of the origins of that

number. In any case, it’s easy to achieve.

I have used the batch-sparge technique for my last 4 batches and I see no reason to ever return to fly-sparging. The process cuts at least 30 minutes from my brew day and is much less stressful. Give it a try next time you brew and let me know what you think.