

Cheap 'n' Easy Batch Sparge Brewing

Some homebrewers aspire to someday go pro. Some homebrewers like to use pro style systems and techniques for their homebrewing endeavors. Some homebrewers get their kicks from designing fancy automated systems for the brewing. Not me....I like the simple, hands on approach to brewing. Kind of the same way you think of cooking. For me, it's "Cheap 'n' Easy" batch sparge brewing.

What is sparging and how do you do it?

Sparging is the rinsing of the grain bed to extract as much of the sugar from the grain as possible without extracting mouth puckering tannins from the grain husks, says John Palmer (How to Brew, John Palmer 2nd Edition 2000, 2001). We'll further specify that sparging begins only after runoff of the sweet wort from the mashtun has begun. Otherwise, there would be no such thing as no-sparge brewing, which we'll get to in a minute.

Fly Sparging

The usual way most brewers sparge is continuous (also called on the fly, or fly) sparging. In this method, after vorlauf, the wort runoff is begun and water is added to the mash tun at the same rate as the runoff. It's important to go slow so as to extract the maximum amount of sugar and not compact the grainbed, which would stop the runoff. Lauter design is also highly important in fly sparging. Your lautering system must allow no channeling, or the sparge liquor will "drill" straight down through the grain bed in only one or 2 locations and leave the rest of the mash unrinsed. Because the buffering power of the grains in the mashtun is continually being diluted by the sparge water, it's necessary to monitor the pH of the runoff. Too high a pH will cause the extraction of tannins and polyphenols, compromising the quality of the beer. To counteract this, it is often necessary to acidify the sparge water to keep the pH of the runoff below 6. Because the runoff may take an hour or more, many brewers do a mashout step in an attempt to denature the enzymes and prevent further conversion from taking place while the sparge is happening. However, this method will usually yield the highest extraction from the grain.

No Sparge Brewing

As described by John Palmer in his BYO article "Skip the Sparge" (May-June 2003), a no sparge brew has the entire volume of "sparge" water added to the mash and stirred in before any runoff has taken place. Even though additional water has been added, since it's been added to the mash before runoff has begun, we can more properly think of it as a mash infusion, rather than a sparge addition...hence the name "no-sparge". This method is the easiest way to mash, but at the expense of poor extraction, typically 50%. The advantage, though, is that because all the sugar from the mash is in solution from the agitation of adding the water, lauter design has minimal effect.

Batch Sparging

Batch sparging is like partigyle brewing or the English method described in Palmer's How to Brew, but instead of a separate beer being made from each runoff, the runoffs are combined into a single batch. In batch sparging, mashing is done at the normal ratio of anywhere from 1 to 1.3 qt./lb. After conversion, the sweet wort is recirculated as normal and the mash tun is completely drained as quickly as possible, and an addition of sparge water is added. This is stirred into the mash, allowed to rest for a few minutes, thoroughly stirred again, and after recirculation is once more drained as quickly as the system will allow. Sometimes, multiple batches are added if necessary or an additional infusion is made before the first runoff is begun. The advantages of batch sparging are no (or reduced) worries about pH because you're not continually diluting the buffering power of the grains, inefficient lautering systems don't really affect the extraction rate since the sugars from the grain are in solution, a mashout is seldom necessary (though may still be desirable) since the wort will be in the kettle more quickly and enzymes denatured by boiling, and extraction rates that range from slightly less to slightly more than fly sparging. The more inefficient your lautering system is for fly sparging, the bigger the gain in extraction you'll see from batch sparging.

Formulae and definition of variables

Most of the following is drawn from and builds on the work of Ken Schwartz (Ken Schwartz, "A Formulation Procedure for No-Sparge and Batch-Sparge Recipes" - <http://home.elp.rr.com/brewbeer/files/nbsparge.html>) and Bob Regent (Bob Regent, "Batch Sparging" - <http://bayareamashers.org/maindocs/BatchSparging.htm>). The main concept we're going to be working with is that for the best efficiency, the runoff volumes from your mash and batch sparge should be equal. In order to do that, it's sometimes necessary to infuse your mash with extra water before the first runoff. Here's how it works...

$R1$ = initial runoff volume which = mash water volume - water absorbed by grain (assumed to be .1 gal./lb. for this example since that's the way my system works...use your own figure)

S = batch sparge water volume

V = total boil volume (amount in needed in kettle for boil)

I = volume of infusions for a step mash

$R1 + I + S(1) + S(2) + S(\text{etc.})$ must equal V

AND

$R1 + I = .5V$

Let's see how this works in a brewing session. Assume a recipe with 10 lb. of grain, and that you need to collect 7 gal. of pre boil wort. A mash ration of 1.25 qt./lb. would require 12.5 qt. or 3.125 gal. of strike water. Based on an absorption of .1 gal./lb., the mash would absorb 1 gal. of water so we'd get 2.125 gal. of water from the mash. Since we want to collect 3.5 gal. (or 50% of the boil volume), after the mash is complete we'd add 1.375 gal. (5.5 qt.) of water to mash tun before the first runoff. Stir the additional water in, let it sit for a few minutes, then vorlauf until clear and start your runoff. After the runoff, we add 3.5 gal. of batch sparge water. Stir it in, rest 10-15 minutes, stir again, then vorlauf and runoff as before. These two runoffs will give us our pre

boil volume of 7 gal. of sweet wort.

Now, let's take a look at how to build the equipment and do a brew session!

Building the Mashtun

For the mashtun, you'll need a cooler. I prefer the rectangular ones. The large top opening makes it easier to stir the mash than a round cooler does. Since grain bed depth makes practically no difference in batch sparging, one of the main reasons people use the round coolers is nullified. The rectangular ones are also cheaper. You'll also need a rubber bung for a minikeg, some 1/2 inch ODx3/8 inch ID food grade vinyl tubing long enough to reach from whatever you set your cooler on to the bottom of your kettle PLUS 6 inches, an inline nylon valve, and a length of water supply line with a stainless steel braid for a jacket, and 3 hose clamps. The length of the water supply line doesn't really matter. I use one that's long enough to run the length of the cooler, but my experiments have shown that shorter ones seem to work as well. Feel free to substitute parts if you'd like something a little snazzier. The only really crucial piece of the whole setup is the stainless hose braid, so if you want to put a fancy ball valve or something else on your mashtun, go for it!

NOTE: The minikeg bung fits snugly into the hole left from removing the drain in most of the 48-54 qt. coolers I've checked. If the fit is loose, or you're worried about leakage, apply some food grade silicone sealant on the flange before inserting the bung into the cooler. Be creative!

Step by Step

- 1.) Remove the spigot from the cooler. Usually, there's a nut on the inside of the cooler holding the spigot on. Unscrew that and the spigot should pop right out.
- 2.) Remove the plastic insert from the hole in the minikeg bung, and insert the bung into the spigot hole, from the inside of the cooler. The beveled edge of the bung goes in first, and the flange of the bung should end up flush with the cooler wall.
- 3.) Cut off a 6 inch piece of the vinyl tubing and, from the inside of the cooler, insert it into the hole in the minikeg bung. Let a couple inches of tubing protrude from each side of the cooler.
- 4.) Cut the threaded fittings off the water supply line (I use a hatchet). Pull the tubing out from the braid, leaving you with a hollow length of hose braid. Flatten the last inch or so of one end of the braid. Fold it over on itself 3 times to seal the end. Squeeze the fold with a pair of pliers to crimp it closed.
- 5.) Slip a hose clamp over the end of the braid, and slip the braid over the end of the vinyl tubing INSIDE the cooler. Tighten the clamp until snug, but don't squeeze the tubing shut! photos 2nd row #2 and #3
- 6.) Insert one end of the valve into the tubing on the outside of the cooler and secure it with a hose clamp. Slip another hose clamp over the end of the long piece of tubing, connect the tubing to the output side of the valve, and secure with the hose clamp.

That's it! You've built your Cheap 'n' Easy mash/lauter tun! Now, let's brew some beer!

Brewing Your First Batch Sparge Beer

Lét's walk through an actual brew session. This is from a 8 gallon batch of altbier I brewed recently ([pictures here](#)). Remember that the method can be used with any brewing system or equipment. I'm going to describe how to do it the "Cheap 'n' Easy" way.

The equipment you'll need is:

Your converted cooler mash tun

a pot to heat water in (5 gal. minimum recommended)

a 1-2 qt. heatproof pitcher (preferably unbreakable)

your regular brewing equipment-thermometer, boil kettle, and whatever else you normally use

In the [photo](#) you can see my cooler, converted keg boiler, a 7 gal. aluminum pot for heating water, a thermometer, a 2 cup Pyrex measuring cup, a 1/2 gal. plastic pitcher, and the pickup tube for my kettle.

The things that you need to know to figure your water volumes are:

Total grain weight - in this case, 19.3 lb.

Strike water volume - in this case, 1.24 qt./lb or 6 gal.

Absorption of water by grain - in my system, it's 10 lb. of grain absorbs 1 gal. of water. Some systems absorb 1 gal. for 8 lb. If you don't know your absorption volume, measure your first runoff volume the first few brews. By knowing how much water you put in and how much wort you got out, you can easily figure your absorption. Preboil volume - how much sweet you need to start with. For this batch, we want 10 gal.

OK, we're ready to brew!

- 1.) Mash in with 6 gal. of water for 1.24 qt./lb. I use the pitcher to pour water from the 7 gal. kettle (4th row 1st photo) until the kettle is light enough to lift and pour the rest of the water in. I predict that the grain will absorb 1.9 gal., so I should get just about 4 gal. out of the mash.
- 2.) Since I'd like to get 5 gal. out of this runoff, I infuse with 1 gal. of water at the end of the mash, before the first runoff. I add boiling water to get as close to the 168F mashout temperature as I can and stir it in.
- 3.) After 10 more minutes, I begin to recirculate the mash by draining into the pitcher (5th row 1st photo). I only open the valve partially at first, then as the runoff clears I open it up fully. With the hose braid, I usually only have to drain about a quart or so until it's clear. Keep draining and recirculating until the runnings are clear and free from pieces of grain.
- 4.) Once the runnings clear, direct the runoff to your kettle, and slowly pour the contents of the pitcher back over the top of your mash.
- 5.) Completely drain the mash tun as fast as your system will allow.
- 6.) As the first runoff progresses, start heating your batch sparge water. In this case, we're going to heat 5 gal. to about 185F to try to get to a grain bed temperature in the 165-168F range.

- 7.) When the first runoff is done, close the valve and once again use the pitcher to add your sparge water until the pot is light enough to lift. Then pour the rest in. Stir the grain thoroughly, close the cooler, and let it rest for a few minutes.
- 8.) After the rest, open the cooler and thoroughly stir the grain once again...yep, you heard right! We want to get all the sugar into solution in the water.
- 9.) Go through the recirculation and draining process again, once more draining the cooler as fast as your system will allow.
- 10.) Continue the brewing process as you usually do

Congratulations...you've batch sparged! Like anything else in brewing, it may take a couple tries before you get everything figured out completely. But with batch sparging, you can brew all grain beers with a minimal investment in equipment, and a pride in the hands on fun of brewing.

BREWING WITH DENNY

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This system is designed and optimized for batch sparge brewing. I typically get 75-80% efficiency. While the basic design could be used for fly sparging, the single hose braid in the cooler would encourage channelling and lower the efficiency.



Converted keg on floor, 7.5 gal. aluminum pot on 170K BTU propane burner, 48 qt. Rubbermaid cooler on table with spoon in front

On top of cooler: 2 cup Pyrex measuring cup, cooper pickup tube for kettle, thermometer, 2 qt. plastic pitcher

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Variables

Batch Size (gal.)	5
Grain Bill (lbs.)	10
Boil Time (hrs.)	1
Tub Loss (gal.)	.5
Equipment Loss (gal.)	1
Mash Thickness (qts/lb.)	1.25
Grain Temperature (deg.)	70
Target Mash Temperature (deg.)	152

Constants

Wort Shrinkage (pct)	4
Grain Absorption Constant (gal/lb)	0.1
Percent Boiloff per Hour (pct/hr)	10

Results

Total Water Needed (gal.)	8.67
Mash Water Needed (gal.)	3.13
Sparge Water Needed (gal.)	5.54
Strike Temperature (deg.)	165.12

Field Explanations

- **Batch Size** - The number of gallons you plan to put into the primary fermenter.
- **Grain Bill** - Pounds of barley malt, rye, or wheat used in the recipe - excludes sugars, honey, etc. that do not absorb water readily.
- **Boil Time** - Number of hours to boil the wort (e.g., a 90 minute boil would be 1.5

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