Bobby_M's All Grain Brewing Primer from www.suebob.com/brew

There are plenty of sites out there that probably describe all grain brewing better than I can, but what I'd like to offer is my personal perspective and why I do what I do. Most of what you'll find here is things I've said many times already on the homebrewtalk forum when trying to help new brewers who have trouble with the process.

What is All Grain Brewing?

I want to back up just for a moment and mention that all beer is technically "all grain". The fermentables in beer, with the exception of cane sugar/honey type adjuncts, all comes from grain. When you buy malt extract (dry or syrup) from a homebrew shop, it was produced by condensing wort that was extracted from various grains. All grain brewing simply takes out the middle man. Just a quick note before we go further, steeping a pound or two of grain as part of extract brewing isn't the same thing.

The Mash

Without getting too technical, mashing is simply mixing crushed/milled grain with warm/hot water. The water hydrates the starches in the grain and activates enzymes that convert the grain's starches into sugar that yeast can consume. Of course there are a lot of variables involved like how much water and at what temperature, how much grain, for how long, etc. that affect the overall performance of the mash, but you don't have to understand it all to make it work. Again, many texts will get further into the science of every step involved but let's get into some things you'll need to consider at a high level.

Vessel/Container/Mash Tun

Just where are you going to mix the grain the water together? This "thing" is call a mash tun (sounds like ton and rhymes with fun). There are a few trends you'll find in homebrewing as to which containers are used but the truth is, you can use just about anything that will hold liquid. Two attributes that we like to see are the vessel's ability to hold heat (insulated) and/or its ability to be heated directly. Some examples are pots, beverage coolers, and buckets. As you can imagine, there are sometimes tradeoffs. Pots/kettle can be heated directly if necessary but don't hold heat well. Plastic beverage coolers hold heat well but can't be directly heated.

Mash Temperature

I mentioned "warm/hot" water being used to create a mash but the temperature does have to be slightly more exact. Basically the equalized temperature of the mash should be in the range of 148-158F. There are more temperatures that are used in more complex processes but I'm avoiding them on purpose. The temperature at which your mash settles will have an effect on which enzymes are most active and ultimately on how fermentable your wort will be. Mashing lower near 148F will cause a lower final gravity (dryer beer) while mashing high near 158F will cause a higher FG (sweeter beer). Many all grain recipes will quote a "sac rest" mash temp and it will likely be somewhere in the middle of this range at 152F or so.

It is important to note that if you're trying to hit a temp of 152F, you will NOT be using 152F water.

There will be a temperature exchange between the water and grain that will lead to some other equalized temp. This is somewhat complicated but predictable and a lot of software and web applications have been developed to help you know what temp the water needs to be based on the volumes and grain weight you use. For example purposes only, I normally add about 168F water to room temp grain in order to equalize at 152F.

Rest Time

Now that you've gotten your mash temp to where it needs to be, it has to be held there for a while because it takes time for the enzymes to convert starch to sugar. You don't want the temperature to fluctuate to a point where the enzymes become inactive. Ok, so how long then? Like everything else, it depends. In general, 60 minutes tends to work for most situations. Warmer mashes tend to convert faster while cooler temps convert slower. Note that brewing speed is NOT a good reason to alter your mash temp. This is just a general guideline that suggests you might be able to get away with a 30-45 minute mash if you already decided to mash high at 156F for example. 90 minute mashes at 148F are not unheard of. There's two ways to tell if you're fully converted. The first is a taste test. Sure, it's not exact science but a quick taste should yield sticky sweet wort. The second more exacting method is to do an iodine test. If you mix a little of the mash wort with iodine on a white plate, purple means there's some starch left to convert.

If you stick to an average temp as you likely will, 60 minutes is usually plenty but this also leads well into the next topic of:

The CRUSH

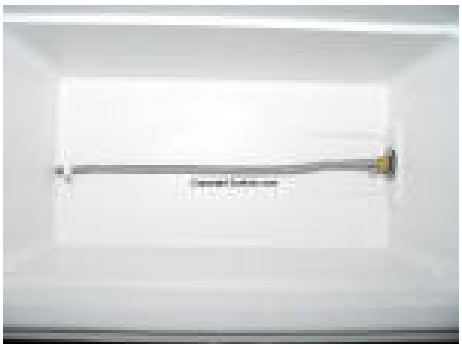
How coarse or fine the grain is milled will have an effect on how accessible the starches become to the enzymes. In a very coarse crush, it's going to take a good deal longer for the conversion to happen. It will also be harder to rinse the sugars from the grain during the sparge/lauter which we'll get to later. Realizing it's difficult to change the crush if you're not milling it yourself, it's important to realize that a longer mash rest time could be beneficial if you're stuck with a coarse crush. A "good" crush is generally regarded as a mix of flour, coarse endosperm (the interior white part of the grain at about the size of coarse sea salt), and halved husks (not pulverized). You certainly don't want to see any whole kernels intact. The crush has a huge affect on efficiency which we'll also cover later.

Grain to Water Ratio

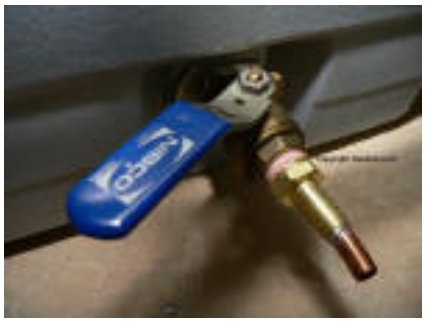
This attribute is also known as mash thickness. In general, you'll use about one to two quarts of strike water per pound of grain (*strike water is just the term used for the water initially added to your grain*). Thicker mashes are down near 1 or 1.25qts/lb have a similar affect as using a hotter mash temp. Thinner mashes near 1.75 to 2qts/lb tend to act like cooler mash rests. Many brewers, myself included, target around 1.25 quarts per pound which is a good compromise between fermentability and efficiency. Don't forget that your ratio is going to affect how hot the strike water will need to be so your software will help you with this.

Lautering / Sparging

After you've held your mash to achieve starch to sugar conversion, you're left with a sweet sticky wort that is just full of spent grain particles. You've probably been told not to boil grain in the kettle because of the nasty tannins you'll extract so you're going to need to separate the wort from grain. This separation is called lautering and can be done in a few different ways.



By far the most common way home brewers perform a lauter is by installing some kind of screen/filter in the bottom of their mash tun that ultimately leads to a drain spigot. If this type of device is installed, the vessel is actually referred to as a mash/lauter tun (MLT for short) because it performs this dual purpose.



This filter can be a stainless mesh, a perforated sheet called a false bottom, or a manifold of copper or CPVC tubing that is drilled or slotted in many places. It is important to note that although these materials are used to stop grain husks from flowing out of the vessel, it is the mesh of husk material itself that creates a filter bed at the bottom of the tun.

Note: The top two pics on the right show one version where a stainless mesh or braid was taken off a sink water supply hose and affixed to the drain bulkhead in a picnic cooler. The third pic is a similar design inside a keg based MLT. The concept is the same.

Vorlauf

I guess this is a German word and I think the best literal translation is "fore runnings". What is means practically to the all grain process is "recirculate". The moment you open the spigot/valve in the lauter tun, you'll notice the first wort that streams out will be carrying bits of grain particles and flour that were small enough to make it into the holes of your filtering medium. For the same reason you don't want to literally boil the grain, you don't want these particles in the kettle. An easy way to vorlauf is to collect the first 2 quarts or so and carefully return it to the top of the mash. You should see the wort clear up a bit after this process, but it won't be crystal clear. Some brewers actually pump the wort from the MLT output back to the top of the mash during the entire mash procedure in which case a separate vorlauf step is unnecessary.

Sparging (Basic)

Let's assume you've figured out how to separate your sweet wort from the mashed grains (this is called "first runnings" by the way). While the wort you drained out will be a very high gravity, it will also be a relatively small volume of liquid. Meanwhile, there is a lot of sugar still left sticking to the grains in the MLT. The term "sparge" is fancy brewer's jargon for RINSE. If you add some more hot, clean water to the grains and run that water out of the MLT through the same separation medium, it will come out sweet also. This additional wort is combined with the first runnings and is ultimately the whole volume of your boil. Up until this point, I've been able to generalize the concept of sparging but now we have to

get a bit technical and recognize there are a few different sparging philosophies and processes. Before I can explain them and list pros and cons of the methods, we have to talk about mash/lauter efficiency because the term is going to be used often in that discussion.

Efficiency (Mash, Sparge, Brew house)

This is one of the most seldom understood concepts for new all grain brewers (frankly I know a few who have brewing all grain for many years who don't quite know what it means).

The first thing I want to do is get the general concept understood. Efficiency is the ratio of how much sugar the grain has available to how much sugar you ultimately extract. Efficiency is literally "bang for your buck". Why should you care what your efficiency is anyway?

> An analogy I like to use is making tomato sauce using canned tomato paste. Let's say a given recipe calls for 50 ounces of tomato paste and they come in 10oz cans. A high efficiency would be like emptying five cans completely. A poor efficiency is like leaving a lot of paste sticking to the sides of the can to the point where you have to open a sixth can in order to get 50 ounces total. Basically, poor efficiency means you get a lower gravity for a given amount of grain used. Again, bang for your buck.

It's important to note that efficiency is really an effect, not a cause (or choice). However, You can measure what your efficiency WAS on a given batch and it can ultimately become predictable if you keep your process consistent. You can also do things to your process to increase it.

The answer to the question begins with first knowing just how much potential sugar the grain has to offer. It does vary from one variety to another and even from one crop to the next. This isn't that tough for a brewer to figure out though because these figures are well published.

Once you know how much it has to offer, your brewing process will affect just how much of it you can extract. There are different points in the brewing process for which efficiency can be measured; Mash, Lauter/Sparge, and Brewhouse.

Mash Efficiency - How much of the available sugar was actually converted from the starch during the mash. This says nothing of your ability to separate that sugar during lautering/sparging. It is difficult to measure this and can be basically ignored if you're sure you've gotten good conversion (starch test).

Lauter/Sparge Efficiency - Assuming you converted all the starch to sugar, this is how much of the available sugars you were able to collect during the lauter/sparge function. Using a separation and sparge method that rinses "best" will yield higher efficiency. This value is easily measured by noting how much wort you've collected pre-boil (volume) and measuring its specific gravity (using a hydrometer or refractometer). These numbers will be compared against the theoretical maximum gravity.. More later.

Brew House Efficiency - This measurement/figure takes into account your entire process and is the most indicative of how much your wort "costs". The volume/gravity measurements are taken post boil, or most accurately in the fermenter itself. This number will be lower the previous efficiency measurement because it takes into account any wort you may have lost in your tubing, absorbed into hop sludge, or spilled between the MLT and Kettle or the Kettle and fermenter.

Calculating Efficiency by hand:

We already know that there are software packages and online calculators that will help you figure out your efficiency at various stages but its a good idea to understand where the numbers come from. I suggest you figure it out on paper (or with a calculator) at least once and compare it to what the software told you. In order to show you how, we'll work on a practical example. Let's say you're brewing a simple 5 gallon pale ale using 10 pounds of American 2-row malt, and 1 pound of Crystal 40L.

We'll look up the specs on these two malt types in the HBT WIKI to find out what their maximum sugar potential is. This is rated in Potential Gravity Points Per Pound Per Gallon (PGPPPG) or just PPG for short. I know, just hang in there :-)

2-row is rated at 1.036 PPG or 36 gravity points per pound and 40L is rated at about 1.034 PPG. So the math:

Fig. 1

(Malt #1's PPG x actual pounds) + (Malt #2's PPG x actual pounds) + ETC = Total Available Sugar or Gravity Points.

(36ppg x 10pounds = 360) + (34ppg x 1pound = 34) = 394 gravity points available

Now that we know the maximum gravity for this grain bill, we have to actually measure the dilution. If you accurately measure the volume of wort you've collected, you will know what the maximum gravity would be. In this example let's say you collected 5 gallons into the fermenter.

Fig. 2

Gravity points available / Collected Volume in Gallons = Maximum Original Gravity

394 / 5 = 78.8 or an maximum SG of 1.079.

So with the above calculation, you've figured out that at 100% efficiency, your 5 gallons would measure 1.079 SG. Of course, no one ever gets ALL the sugar out. This is just a theoretical maximum. The last piece of the puzzle is to actually measure your SG/OG with a hydrometer or refractometer and compare (divide) that figure against the maximum. Let's say for example that you measured 1.065 OG:

Fig. 3

Measured Specific Gravity in Points / Maximum Specific Gravity in Points = Efficiency

65/79 = .82 or 82% efficiency

Note that you might see this calculated using a different order of operations. In the first calculation we figured out the total theoretical points for those grains at 394. You could have also figured out your actual total points by measuring your OG and multiplying that by how many gallons you had. That would be 65 x 5 = 325 total points. Now you use the percentage formula from figure #3 above (actual total points/max total points) or 325/394 = .82 or 82%. It's just two different ways to get the same number.

What is a "good enough" Efficiency?:

This is highly debated in the home brewing community. What number is practical? In my personal opinion, anything over 75% is good enough. I'm happy to be consistent in the high 80's. Any higher than 95% would be risking extraction of undesirable flavors due to oversparging. With the price of grain on the rise though, aspiring to pick up 5 or 10% more is probably worth thinking about.

The Factors that Most Affect Efficiency are:

Grain Crush - You might say that finer crushes ensure more complete conversion. Effeciency begins by making sure you're fully converted. It is possible that your crush is so coarse that you don't get full conversion even after 90 minutes of mashing. Even further, the sugar that is converted is highly guarded from the sparge water.

Mash Rest Time - This is tied in to the previous factor. If your crush was coarse and you didn't mash for long enough, your mash efficiency suffers.

Sparge Technique - (Continuous/Fly, Batch, No Sparge) Hopefully without promoting a heated debate, various sparging techniques are generally accepted to yield slightly higher or lower efficiency. In some cases, higher efficiency is traded for a simpler process or other desirable outcomes. We'll discuss this more when we return to the sparge section.

Lauter tun Design - For the most part, the lauter tun design is highly coupled to the sparge technique the brewer is using. Across all designs, dead space or places where wort can become trapped will lower efficiency.

Sparge Temperature - Sparge temperatures that raise or maintain the grain bed's temperature up near 170F or at least 165F will always yield a higher efficiency. Sugar becomes more soluble in water at higher temperatures. If the grain gets any hotter than 170F however, you might extract unwanted flavors along with the sugar.

Sparge Volume - The more water you use to sparge with, the more total sugar you will extract. Think about rinsing soap off your hands. If one quart is enough to get all the soap off, a pint would probably leave some residue. There is however a point of diminishing returns because the more diluted wort you collect, the longer you have to boil it down to your desired finished batch size. It's not economical spending $8 worth of fuel to save $4 worth of grain.

Batch Target Gravity - This is another factor highly tied to sparge volume. As your desired batch OG goes up, the ratio of grain to total sparge water goes up. This will always drop efficiency down a certain degree. It can become predictable once you dial your process in however.

Sparging Techniques

Disclaimer. Use this information at your own risk. If you state any of this stuff as fact, dogmatic brewers will beat you into submission. Also, in full disclosure, I have only used ONE of the techniques below and will explain why later.

The three different sparging methods I'm going to describe are No Sparge, Fly Sparge, and Batch Sparge. Many people will mix certain aspects of each and call them hybrids of some kind but in many cases, I fail to see the benefit in theory. The benefits may have been indirectly cause by an unknown

modification of the previous process (but we'll see).

The "No Sparge" - Ok, it does seem counterintuitive to describe this here but it's a valid process. Not sparging means that you'd drain the wort out of the lauter tun and use that as your final volume of wort without doing any sparging (rinsing) of the residual sugars. Why would you do that? This volume of wort is extremely high gravity (concentrated). Any wort that is runoff as part of the sparge is of significantly lowered gravity. If you're trying the brew the big barley wine, this is one way to do it. The drawback to this process is a significantly low efficiency (40-50% typical).

Continuous or Fly Sparging - This technique requires the brewer to deliver sparge water to the top of the grain bed at the same or similar rate that sweet wort is lautered out. It helps to picture a horizontal plane of water slowly draining through the grain bed, incrementally picking up more and more sugar before it get pulled into the separation medium. Therefore, you can say that the liquid at the top of the tun is low gravity and by the time it gets to the bottom it is of higher gravity. The sparge water is to be placed gently onto the top of the grain bed so that about an inch of water remains (the grain does not run dry) and so the water does not violently drill into the grain bed. The rate of sparge and drain is done very slowly over 45 to 90 minutes to ensure maximum sugar is pulled into the passing water for the highest possible efficiency. This sparge continues until the maximum desired preboil volume is reached or the runnings gravity becomes 1.010 SG or lower. The benefit to this technique is usually quoted as providing the highest possible efficiency given the ideal equipment and process is used. The possible downside is the requirement to match inlet and outlet flows (requiring gravity or pumps) and the slightly longer time invested. That said, once the flows are matched, the entire sparge is hands off. The lauter tun MUST be designed such that the wort is collected from the bottom as evenly as possible.

Batch Sparging - This technique uses bulk infusions of sparge water as opposed to the constant inflow of fly sparging. Sweet wort is not drained as the sparge water is infused. It happens in "batches" so it's not just a clever name. The biggest distinction in the technique is how the sugar is pulled into the sparge water. In fly sparging, drops of water pick up sugar on it's way through the grain. In batch sparging, the water is thoroughly mixed in so that the gravity of the entire volume is the same. Then it is fully drained out (similar to a no sparge). Batch sparging can be done in multiple infusions in order to increase efficiency and/or account for smaller sized mash/lauter tuns that cannot accept the full required sparge volume. Although batch sparging is said to provide lower efficiency than fly, many brewers, myself included have proven this to be incorrect. While the sparge itself will take less overall time than fly, it is a bit more hands on or labor intensive. We'll talk more about the differences next.

Which to choose? - I admit that many brewers will stick with the method they first learned similar to the way people stick with the religions of their parents. In some cases, you'll stick with one of them until someone shows you a real benefit to the other technique. Anyone can use either one and still make great beer as long as they give that particular process the attention it requires. If someone says their way is better, it really just means that they've found a method that works better for them. It might also work better for you, but you'll have to try it.

I'll always suggest new all grain brewers try batch sparging. The reason is that the equipment is usually cheaper and easier to build and the process is slightly more forgiving. It doesn't require two streams of liquid at the same time so you don't necessarily need tiered vessels. You can also get away with a single pot/burner and not need to keep water hot by other means.

Pitfalls

In fly sparging, one of the important details is the separation medium. False bottoms work really well because it encourages the wort to drop straight down through the grain bed and discourages channeling. Channeling is when wort will find a path of least resistance and avoid a LOT of the sugar leading to low efficiency. The other potential pitfall in fly sparging is letting the sparge water cool off too much over the hour or so. If you don't use a dedicated hot liquor tank with its own heat source, you must keep it in an

insulated vessel.

In batch sparging, many people will take the "it's easier" approach too far and get sloppy with sparge temps, stirring, and overall attention to detail. If you have a large MLT, it's easy to be lazy and try to sparge in one big batch. Unfortunately, this is probably why many people think this method is inherently less efficient.

My Way or the Highway - My Method = N.M.O.D.B.S. - No Mash Out Double Batch Sparge

I spent at least two hours typing everything that precedes this section when I really meant to just type the following.

Ok, all the basic theory aside. Here's how I brew all grain and get a consistent 88-92% efficiency using the Batch Sparge Technique. First, the key points I like to stress about my process are:

Fine Crush - The picture of crushed grain above is actually a little more coarse than I use. I like to see a bit more flour in the mix. If you find that you're getting a lot of slow runoffs or "stuck" sparges, you might have gone too fine. This is hard to control when you buy your grain pre-milled. This is one of the reasons I bought my own mill.

Thicker Mash - We discussed this earlier on but a mash of 1.25 qts/lb or slightly less leaves a ton of extra volume for sparging. I like that.

Stir Well - You must stir well at a few stages of the process. First is when you dough in, any dry spots will NOT convert. No dough balls! You also must stir well after every sparge infusion to fully diffuse the sugar into the water.

No Mash Out Infusion - A mash out is a carry over from fly sparging. In the case of a cooler MLT, many brewers will add a small amount of very hot (sometimes boiling) water to the mash just prior to the sparge to get the grain bed temp up into the high 160's F. I have not found this to be beneficial given my technique and in two test cases it dropped my efficiency 4%. Leave more water for discrete sparge infusions and just drain the first runnings before adding new water.

Hot Sparge - Given that I skip the mash out infusion, I still want to raise the grain bed temp up into the 170F area. In most cases this means sparging with 180-185F water.

Double Sparge - If you need to sparge with say 4 gallons to reach your desired pre boil volume, instead of adding 4 gallons at once, add half, stir, vorlauf and drain. Then do it again with the remaining 2 gallons. Think of washing a glass in the sink. Which gets more soap off; filling it all the way, swishing it then dumping or filling it half way, swishing, dumping and repeating? Goofy analogy but it really works. Now, if you'd like to read a little more on why I think this happens, wikipedia has an article on diffusion (which is the principal at work in sparging).

No Long Boils -This isn't really a technique for maximizing efficiency per say. It's actually the opposite. What I'm getting at here is that although sparging more, collecting more and ultimately boiling down the wort over a very long boil will eek up your efficiency, I just don't like it. Time and fuel offset the slight benefit and all the other points above make this method of jacking up efficiency unnecessary. Just say no Nancy.

The Single Kettle/Burner Method with a simple picnic cooler MLT:

1. First you're going to figure out based on your grain bill, how much water you'll need to make the ratio 1.25qts/lb. Example, if you have 12lb of grain 12 x 1.25 = 15 quarts or 3.75 gallons of "STRIKE" water.
2. Heat strike water in your kettle to ABOUT 185F and dump it into your cooler, then close the lid. Wow, doesn't that seem a bit hot? Your cooler is going to absorb quite a bit of heat in the first 5 minutes. Leave it alone with the cover closed to let it warm up. After 5 minutes, open it up and stir the water, then test the temp. You're going to want it to cool to about 168F. Remember, software will help you figure out exactly what temp to use. Once you reach your ideal strike temp, dough in (mix the crushed grains in thoroughly) then close the lid.
3. After 5 minutes, open the cooler, stir once more and check the temperature in various places. Again, you want it to settle to ABOUT 152F. If it's a degree or two high or low, it's OK. If it's off by more, you might want to compensate with a little cold or boiling water. Once you're satisfied, close the lid and wait 60 minutes.
4. After about 20 minutes, you'll want to start heating your sparge water in the kettle. You'll need ABOUT the same volume as your intended finished batch. If it's a 5 gallon batch, heat up 5 gallons of sparge water to 180F.
5. After the full 60 minute mash, open the drain valve on the MLT and collect 2 quarts of wort into a pitcher. Carefully return this back on top of the mash (this is vorlaufing), then drain the entire MLT into a bucket. If the bucket has graduation marks, take note how much wort you collected. You're going to find that you lost a good percentage of liquid to grain absorption. In our example, it's likely that you only got out 2.5 gallons from the 3.75 strike volume. Here's where you have to decide ultimately how much wort you want in the kettle to start with. You will boil off about 1.25 gallons in 60 minutes of vigorous boil so you'll want at least 6.5gallons to start with. To figure out how much to sparge with, take this pre boil figure (6.5) and subtract it from how much wort you collected out of the MLT for first runnings (say 2.5). This leaves you with 4 gallons. This is exactly how much you'll need to sparge with.
6. Assuming you got the sparge water up to 180F, pour about HALF of the required sparge volume into the MLT (in the example it will be 2 gallons. Stir it well for a couple minutes, vorlauf 2 quarts again, then collect it in the same bucket the first runnings are in.
7. Repeat step 6 again with the remaining sparge volume. At this point, you should have about 6.25 gallons in the bucket. You can also split this amount between two buckets to make handling them easier.
8. Remove any excess water from the kettle and carefully transfer all your wort from the buckets into the kettle. Stir this wort up and draw off a bit to measure your pre-boil gravity and take note of it. You'll also need an accurate measurement of how much volume you collected. Once you have these two numbers you can figure out your mash/lauter efficiency as explained earlier on this page.
9. Proceed as you normally would for an extract batch. You've just made your own wort without "instant beer".

The DOUBLE Kettle/Burner Method with a simple picnic cooler MLT:

The process is VERY similar but saves about 30 minutes overall. I'll note the differences with color.

1. First you're going to figure out based on your grain bill, how much water you'll need to make the ratio 1.25qts/lb. Example, if you have 12lb of grain 12 x 1.25 = 15 quarts or 3.75 gallons of "STRIKE" water.
2. Heat strike water in your kettle to ABOUT 185F and dump it into your cooler, then close the lid. Wow, doesn't that seem a bit hot? Your cooler is going to absorb quite a bit of heat in the first 5 minutes. Leave it alone with the cover closed to let it warm up. After 5 minutes, open it up and stir the water, then test the temp. You're going to want it to cool to about 168F. Remember, software will help you figure out exactly what temp to use. Once you reach your ideal strike temp, dough in (mix the crushed grains in thoroughly) then close the lid.
3. After 5 minutes, open the cooler, stir once more and check the temperature in various places. Again, you want it to settle to ABOUT 152F. If it's a degree or two high or low, it's OK. If it's off by more, you might want to compensate with a little cold or boiling water. Once you're satisfied, close the lid and wait 60 minutes.
4. After about 20 minutes, you'll want to start heating your sparge water in the smaller of your two kettles. You'll need ABOUT the same volume as your intended finished batch. If it's a 5 gallon batch, heat up 5 gallons of sparge water to 180F.
5. After the full 60 minute mash, open the drain valve on the MLT and collect 2 quarts of wort into a pitcher. Carefully return this back on top of the mash (this is vorlaufing), then drain the entire MLT into the larger of your two kettles. Get this wort onto a low to medium flame on your second burner and get it boiling. Take note how much wort you collected. You're going to find that you lost a good percentage of liquid to grain absorption. In our example, it's likely that you only got out 2.5 gallons from the 3.75 strike volume. Here's where you have to decide ultimately how much wort you want in the kettle to start with. You will boil off about 1.25 gallons in 60 minutes of vigorous boil so you'll want at least 6.5gallons to start with. To figure out how much to sparge with, take this pre boil figure (6.5) and subtract it from how much wort you collected out of the MLT for first runnings (say 2.5). This leaves you with 4 gallons. This is exactly how much you'll need to sparge with.
6. Assuming you got the sparge water up to 180F, pour about HALF of the required sparge volume into the MLT (in the example it will be 2 gallons. Stir it well for a couple minutes, vorlauf 2 quarts again, then collect it in the larger kettle that is already on the flame. You can use an intermediate vessel to move the wort to the kettle if it's easier.
7. Repeat step 6 again with the remaining sparge volume. At this point, you should have about 6.25 gallons in the kettle.
8. Remove any excess water from the kettle and carefully transfer all your wort from the buckets into the kettle. Stir this wort up and draw off a bit to measure your pre-boil gravity and take note of it. You'll also need an accurate measurement of how much volume you collected. Once you have these two numbers you can figure out your mash/lauter efficiency as explained earlier on this page.
9. Proceed as you normally would for an extract batch. You've just made your own wort without "instant beer".

Notice that the only change is that you collect into a kettle while continuing to heat and hold sparge water in another kettle. The benefit is that you can start heating your wort runnings as you collect them which shaves some time off the day. In the first method, you can't start heating the wort until you've emptied all the sparge water from your only kettle.

If you have any questions about what I wrote here, the best way to get to answers is to log on to www.homebrewtalk.com, post a new thread to the all grain forum and copy/paste the part of this article that you'd like more clarification on. I'll probably find it and post my 2 cents, but the best part is that you'll have a whole lot of other experienced brewers weighing in on the topic as well.

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