Brew in a Bag (BIAB)

For many homebrewers, one of the most intimidating aspects of all-grain brewing isn't learning to mash or worrying about efficiency, but the money needed to upgrade to the necessary equipment. There are alternative means to all-grain brewing that do not involve building or purchasing a mash tun and additional kettles, one being brew in a bag. Brew in a bag, commonly referred to as BIAB amongst the homebrewing community, is a form of all-grain brewing that eliminates the need for a separate mash tun and allows a brewer to conduct the entire brewing process in one kettle.

What Is Brew In A Bag?

In simple terms, brew in a bag is a form of all-grain brewing that can take place entirely within your boil kettle. The grains are placed in a bag which is submerged into the kettle for a mashing process (hence the name, brew in a *bag*). When the mash is complete, simply pull the bag of grains out, much like you would an oversized tea bag, let it drain of all the leftover wort, and continue on to the boil. That is it! The method of conducting the entire process in one kettle with no additional sparges is known appropriately as single-vessel, no-sparge brew in a bag. From this most simple point, homebrewers can add sparge steps, which will involve additional kettles, amongst other customizations.

Because of the simplicity of the process and equipment, BIAB has become a popular means of all-grain brewing for homebrewers new to mashing, living in small confines, pinching pennies, or brewing small batches.

What Equipment Will I Need?

When pursuing a single-vessel, no-sparge brew in a bag method, the required equipment is minimal. The most important piece of equipment will be your kettle. Because the entire mashing and boil process takes place in this one kettle, you will need to make sure that it is capable of holding not only the entire pre-boil volume for a full boil, but also the volume of the strike water and grains. Also, the less head space you have in your kettle will aid in retaining heat during the mash. For 5 gallon batches, assuming a 7-7.5 gallon pre-boil volume, at least a 10 gallon kettle is recommended. If you are brewing beers with high original gravities, you may need to consider an even larger pot.

The second most important piece of equipment is the bag. The ideal BIAB bag will be able to fit around the circumference of the boil kettle while not resting on the bottom to prevent scorching and will retain most of the grain sediment so as not to have too many solids left for the boil. Pre-made bags can be purchased from your local homebrew shop, but many homebrewers buy pre-

made curtains or bulk fabric to fashion their own. Voile is widely accepted amongst homebrewers as a cheap and effective material for BIAB bags. Besides the kettle and the bag, the usual brewing equipment needed for the boil and post-boil are needed, including a thermometer, hydrometer, and stirring spoon.

Preparing for BIAB

For this example, we will be walking through how to conduct a single-vessel, no-sparge brew in a bag. The no-sparge aspect of this method means that the grains will be mashed in enough water to reach the full boil pre-boil volume without any additional rinsing steps or water additions. We will be referencing the following recipe from *Brewing Classic Styles* by Jamil Zainasheff and John Palmer:

Ruabeoir Irish Red

Ingredients for 6 U.S. gallons (L):

- 11.25 lb (5.1 kg) | British pale malt
- 6.0 oz (170 g) | Crystal (40 °L)
- 6.0 oz (170 g) | Crystal (120 °L)
- 6.0 oz (170 g) | Roasted Barley (300 °L)
- 1.25 oz (35 g) | Kent Goldings, 5% AA (60 minutes)
- Yeast: White Labs WLP004 Irish Ale, Wyeast 1084 Irish Ale, or Fermentis Safale US-05

Specifications:

- **Target Original Gravity:** 1.054 (13.4 °P)
- **Target Final Gravity:** 1.014 (3.6 °P)
- **IBU:** 25
- **Color:** 17 SRM (33 EBC)
- **Alcohol:** 5.2 ABV (4.0% ABW)
- **Boil:** 60 minutes
- **Efficiency:** 70%

Determining Strike Water Volume

Because this method eliminates the need for a sparge, the standard 1-2 quarts of water per pound of grain method when typically mashing is not followed. Instead, it is necessary to calculate the correct amount of strike water that will produce enough wort for the pre-boil volume. Three

variables are necessary when calculating strike water volume: grain weight, grain absorption, and boil off rate.

The grain weight is determined by your recipe; simply add up all the grains and that will give you the total. Grain absorption is best given as a range. It is commonly accepted that 1lb of grain absorbs 0.1 - 0.125 gallons of water. This range will vary depending on grains used and the total grain weight. We will be using 0.1 gallons lost per pound of grain for this example.

The boil-off rate is best determined by taking notes during prior brew days and learning about how much water is lost per hour of boil on your heat source. For this example, we will simply assume 1 gallon of water is lost per hour of boil.

Let's recap our variables:

Total Grain Weight: 12.375 lb
Grain Absorption: 0.1 gallons per pound of grain
Boil off Rate: 1 gal per hour

Calculating Strike Water Volume

First it is helpful to determine the necessary pre-boil volume. To do this multiply your boil off rate (in gallons per hour) by the duration of the boil (in hours) and add this number to the batch volume. With the variables above, this will give us a 6 gallon pre-boil volume.

(Boil Duration (hr) x Boil Off Rate (gal/hr)) + Batch Volume (gal) = Pre-Boil Volume (gal)

(1 hr x 1 gal/hr) + 5 gallons = 6 gallon pre-boil volume

Once you have determined your pre-boil volume, you can calculate the strike water volume by multiplying the weight of the grain (in pounds) by the absorption rate (in gallons per pounds) and add this number the pre-boil volume. This will give us a strike volume of 7.24 gallons.

(Grain Absorption Rate (gal/lb) x Total Grain Weight (lb)) + Pre Boil Volume (gal) = Strike Volume (gal)

(0.1 gal/lb x 12.375 lb) + 6 gal = 7.24 gallon strike water volume

Determining Strike Temperature

Determining the temperature of the strike water so as to reach the target mash temperature after combining the heated water and cool grains is done the same way as in partial mash and all-grain

brewing. Generally, you add 8-12°F (4.4-6.6°C) to the desired mash rest temperature, but knowing your system and what to expect will aid greatly in accuracy. For Ruabeoir, the recipe calls for a 60 minute mash at 152°F (66.7°C), so the strike water should be heated up in the range of 160°-164°F (71.1-73.3°C).

Conducting a BIAB

Brew in a bag can be likened to making a huge volume of tea with the biggest tea bag you have probably ever handled. First, place your bag around the rim of the kettle and make sure it is secure. Some homebrewers purchase bags with drawstrings from their local homebrew shop which can be used to secure the bag, but others purchase material that is not sewed into a bag, which can be secured using a bungee cord or something similar. Once the bag is in place, add your strike water and bring it to the necessary temperature. NOTE: some BIABers will add the bag after heating the water to ensure the bag is not scorched from the heat source.

When your strike water reaches the target temperature, remove the heat source and stir the grains into the bag. Make sure that all the grain is soaked and there are no dough-balls forming. Cover and wait 60 minutes. If possible, avoid checking the temperature until the end of the mash to prevent heat loss. When conversion is complete, pull the bag of grains out, being careful not to lose any of the grains in the pot, and let drip dry. Squeezing is not recommended. Assuming you hit your target pre-boil volume, carry on with the boil as you would with any extract, extract with grain, partial mash, or all-grain batch of beer. If you collected too much wort, increase the boil time to compensate. If there is not enough wort, you can heat up enough water to reach your target to 170°F (76.7°C) and pour it through the grain bag. This is technically a sparge step and is not intended in a single-vessel, no-sparge brew in a bag process.

The boil and post-boil process is the same as any batch of beer.

Increasing Efficiency

One of the biggest downsides to brew in a bag is the efficiency compared to fly or batch sparging in a mash tun. It is not uncommon to have efficiencies in the 50-60 percentile. That being said, many BIABers are achieving efficiencies comparable to the traditional forms of mashing in the 70-80 percentile. Here are a few suggestions to increase mash efficiency when conducting a brew in a bag:

1) **Run your grains through the mill twice**. This will allow for converted sugars to be extracted from the grains easier. Because the grains are removed using a bag, concerns with having slow or

stuck drainage that typically come along with mashing over-crushed malt in a mash tun are not so much a concern.

2) **Increase mash rest duration**. Some homebrewers have found longer mash durations allow for more conversion and ultimately higher efficiency. An iodine test or hydrometer can be utilized to monitor when conversion is complete.

3) **Use the ideal bag material.** If you use a bag that has to course of mesh, you will likely end up with decent efficiency along with grain sediment floating in your boil kettle. If you use to fine of a bag, you will have sediment-free wort, but may be losing some of the sugars. Use a bag that will allow the wort to flow out of the grain bag easily while also keeping grains contained.

4) **Sparge.** Sparging is one of the best ways to ensure all the sugars have been rinsed out of the mashed grains. Sparging during a brew in a bag can be done in two ways. First, you can heat up your desired amount of sparge water to about 170°F (76.7°C) in a separate kettle. After removing your grain bag from the mash, submerge it in the sparge water for about 10 minutes, stir, remove, and add that water to the boil kettle. The other option is to take the sparge water that is heated and pour it through the grain bag as it is hanging over your boil kettle. This can easily be done with the use of a colander. When sparging, strike water for the mash can be determined using the 1-2 quarts per pound of grain ratio typical of all grain brewing and collecting the additional volume needed when sparging

5) **Calculate recipes with a lower expected efficiency.** This will allow an increased grain bill to make up for any shortcomings due to low efficiency. Use an online calculator or recipe software to adjust recipes to your assumed brewhouse efficiency.