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What is the difference between mashing and steeping?

Mashing and steeping are very similar processes at first glance. Both involve soaking crushed grains in hot water. However, if you look more closely, there are some sharp contrasts between the two methods.

Mashing is a technique in which malted grains are soaked and amylase enzymes from the grains convert their starch to fermentable sugars. Some mashing methods combine malts that are very high in enzymes with starchy grains lacking enzymes. Other mashing methods only use malted grains. Mashing methods using adjuncts, such as rice or corn, work because enzymes from malt are able to move freely about in the mash once the malt has been crushed and wetted. The amylase enzymes cannot differentiate starch from malt or rice, and they go about their merry way breaking down (hydrolyzing) starch into fermentable sugars. The key to mashing is that the starch is broken down into fermentable sugars and special attention is given to controlling the mash environment — I'll get to that later.

Grains that are mashed include any pale malt, lightly toasted or kilned special malts (such as Munich malt) and raw cereal grains.

Steeping, on the other hand, is a method used to extract colors and flavors from certain types of specialty grains. Although the grains are soaked in hot water, the idea is not to have enzymes acting upon starch. Rather, steeping merely extracts compounds contained in the malt. The types of specialty malts ideal for steeping already have the starch converted to sugars during the malting process. These include the family of crystal or caramel malts — grain or malt that is roasted to such a high level that the starch molecules have been modified by heat to the point where malt enzymes don't do much to them. Roasted grains and malts include chocolate and black malt, roasted wheat, roasted wheat malt, roasted rye and roasted barley. Special malts such as Munich malts, pale wheat malt, pale rye malt and flaked cereal grains like barley, oats, corn and rice are not well-suited for steeping because these ingredients all contain a lot of starch.

The key differences in the actual processes of steeping and mashing lie mainly in the thickness, temperature, duration and method used to separate the grain from the liquid. Mash thickness, or the ratio of malt to water, is important in mashing because enzymes are affected by the concentration of starch. If it's too high, the amylase enzymes lack the water needed to hydrolyze starch (hydrolysis is a term used to refer to breaking

chemical bonds by the addition of water). If the mash is too thin, the enzymes are less heat-stable and are more susceptible to denaturation (enzyme destruction). Most mashes use between one and two quarts of water per pound of malt (~2 to 4 liters/kg). When it comes to steeping, thin is good and it is common to use ratios as high as six quarts per pound (~12 liters/kg). The thin steep not only improves the efficiency of steeping, it is also convenient since the steep water is usually used to dissolve malt extracts after the steeped grains are removed.

When it comes to mashing, the most critical variable to control is temperature. Different enzymes have peak activities at different temperatures, and some enzymes denature at just a few degrees higher than their activity peak. Brewers have named the various mash temperature rests for enzymes or their substrates because of this critical connection. We have the acid or phosphatase rest, protein rest, beta-glucanase rest, beta-amylase or fermentability rest, the alpha-amylase or conversion rest and the mash-off step. Few brewers include all of these temperature rests in their mash profiles, but mash temperature is always associated with enzymatic activity. These terms are moot when it comes to steeping. This is not to say that temperature is not an important consideration when steeping. Most agree that grain-steeping temperatures should be kept below about 170 °F (~77 °C) to avoid the extraction of astringent tannins from the malt husk. Enzymatic reactions take time and most mashes last at least 60 minutes. Steeping does not require such a long time because the only thing happening is the dissolution of the malt solids. Fifteen minutes is more than enough time for steeping. The final step is separating the grains from the liquid. Most steepers use a nylon bag that is easily removed from the steep like a tea bag. Depending on the amount of grain steeped and the amount of water used, the bag is rinsed with hot water. Mashing requires the more involved method of separating the wort from the grains. This process is called lautering. Wort is separated from the solids in some sort of straining device — for example, a lauter tun — and is thoroughly rinsed with hot sparge water to extract as much wort as possible. This step is required in mashing because of the mash thickness. If the sparging were not used the specific gravity of the wort would be around 1.080, as compared to sparged gravities ranging from 1.040 and higher.

In summary, these are the key difference between mashing and steeping. To the extract brewer who uses steeping for specialty malts, mashing probably sounds very involved compared to steeping. However, the method of mashing is really not much more involved than steeping. It's just that there is a lot more going on, and more variations on brewing to explore, when mashing is entered into the homebrewing equation!

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