Recycling Your Yeast: Harvesting, Washing And Repitching

Yeast can be re-used. The practice of harvesting yeast from the fermenter after the fermentation is complete (a practice known as "cropping") and using it again for the next brew is common in commercial breweries that brew the same beers on a regular and frequent basis, but for home brewers this also makes sense. Yeast is a major factor in the cost of a home brewed beer, and cropping yeast from the fermenter and using it again is a great way to save money.

When a yeast cell becomes inactive it sinks to the bottom of the fermenter. This means that once the fermentation is complete, the yeast cells at the bottom of the sediment layer in the fermenter are the oldest ones with the lowest viability, while the top layer consists of cells that have only recently gone dormant.

There are two basic ways of harvesting yeast: top cropping and bottom cropping. Top cropping involves scooping active yeast cells off the top of a fermenting ale. The advantage of this is that only active (and therefore living and viable) yeast is harvested. This is the method of choice to harvest an ale yeast that will be re-pitched immediately (or at least within 24 hours).

Bottom cropped yeast is recovered from the top layer of the sludge at the bottom of the fermenter after the fermentation is complete. The advantage of this is that the yeast prepares itself for dormancy toward the end of the fermentation by creating a food store within the yeast cells. If the yeast is to be stored for more than one or two days this is the preferred method, and the one we will discuss here. Bottom cropping is also the best option for lager yeasts, because a lager yeast doesn't float on top of the beer to any appreciable degree during the fermentation process.

Cleanliness is essential when harvesting yeast. All tools and containers that come in contact with the yeast must be sterilized, preferably by immersing them in boiling water for at least five minutes.

The easy way to crop yeast is to use a sterilized spoon or ladle to scrape the top off the sediment layer at the bottom of the empty fermenter, and to transfer it to a sterilized jar with a screw-top lid. You should collect about a cup worth of yeast sludge, and fill the jar for no more than half (i.e. the jar should have a volume of at least half a litre). Close the jar and put it in the back of the fridge. It will keep for several weeks, although the viability of the yeast will drop steadily over time. However, the relatively large number of yeast cells in a cupful of sludge should ensure a sufficient number of viable yeast cells after a storage period of up to four weeks. Note that viable yeast cells are lighter in colour than dead yeast cells. When the sludge begins to turn brown and approach the colour of peanut butter, it is time to throw it away.

Take the yeast sludge out of the fridge a few hours before use, and let it come up to room temperature gradually. The contents will have separated into an almost clear liquid on top, a layer of yeast sludge in the middle, and a thin, darker layer of sediment at the bottom. Open the jar carefully: it may have built up pressure and the sludge may be foamy. Pour off most of the liquid, then close the jar again and gently swirl the sludge to mix with the remaining liquid. Do not shake or tilt the jar and try to leave the thin bottom layer of sediment undisturbed as much as possible. Open the jar again and pour most of the sludge into the fermenter, leaving the last 10-20% behind in the jar. This residue will have mostly dead yeast cells and other inactive solids in it, and can be thrown away. You may notice a slightly longer fermentation lag than you would experience with fresh yeast, but within 24 hours your recycled yeast should be on the job as if nothing happened.

How many times yeast can be harvested and re-used in this way is a matter of debate. The yeast may mutate over time, collect contaminants, or otherwise degrade. After several cycles of reuse you may notice a reduction in flocculation resulting in a less clear beer. This indicates that the average size of the yeast cells diminishes. Some brewers are happy to recycle their yeast up to ten times, others don't feel comfortable with more than four times. In other words, your mileage may vary. Wyeast Labs advises that if yeast harvesting is done properly, yeast can be reused for at least seven generations.
Sometimes a fresh batch of wort is poured on top of the yeast sediment left behind in the fermenter after the first batch of beer has finished fermenting. While this works, and guarantees an almost immediate start of the fermentation process, it should be remembered that the old and dead yeast cells are still present in the fermenter. If you have just finished a quick fermentation and you expect the second batch to ferment quickly as well then you can probably get away with it once. However if the yeast gets too old, autolysis flavours will become a problem. Also remember that the yeast won't undergo a growth phase as otherwise would have been the case, which means that the many flavour components that are formed during this phase will be lacking from the finished second batch of beer.

A more advanced way of yeast harvesting involves a process known as "yeast washing". Simply put, yeast washing is a procedure which ensures that only the healthiest yeast are pitched into the next batch of beer, while dead yeast cells and inactive solids are removed and the amount of active bacteria in the slurry is reduced without damaging the viable yeast cell population.

A simple yeast washing process involves the following steps:

1. Transfer yeast slurry to a sterilized container that is large enough to hold about a cup of slurry plus four times as much water (in other words the container should have a volume of at least 1.25 litres). While the steps below will remove most contaminants and impurities, it is still best to harvest the yeast that has settled most recently, i.e. from the top layer of the sediment in the fermenter.

2. Add sterile water (water that has been boiled and then cooled down to the temperature at which the yeast slurry has been harvested) leaving about 10% head space in the container.

3. Seal the container tightly and shake it for a minute or so to mix the water and the slurry. Refrigerate the container until stratification occurs (separation between the different layers in the jar: solids at the bottom and water on top). This generally takes at least an hour, possibly more.

4. Open the container and discard the top layer (which will be mostly water).

5. Transfer the middle layer (which will be healthy yeast cells) to another sterilized container. Discard the bottom layer.

6. Refrigerate the yeast sample to 2-4°C. Maintain this low temperature from now on. Don't let the temperature of the yeast exceed 5°C.

7. Two hours prior to pitching, add and thoroughly mix in some food-grade phosphoric acid until the pH of the slurry is between 2.0 and 2.4. (You will need a sterilized pH tester or test strip the first time you do this; after that simply use the same volume of phosphoric acid for the same volume of yeast sludge.) This level of acidity will kill bacteria and weak yeast cells but not harm the healthy yeast. It is recommended that you use phosphoric acid that is either pure or diluted not to more than 75%. You will need little acid, so add it carefully so as not to overshoot your pH target.

   • Hold the yeast at this pH and temperature for two hours. Stir regularly to prevent separation but be sure to stir gently in order not to damage the yeast cells.

   • Let the yeast come up to pitching temperature and pitch immediately. This will introduce some phosphoric acid into the beer, but this will be diluted upon pitching to such a low level that it will not influence the quality of the beer. If you are uncomfortable with introducing acid into the wort, let the slurry stand refrigerated at 2-4°C for another two hours or so until it separates, then pour off the top layer of liquid (which will be mostly acid).

Note that his procedure does not remove wild yeasts or other contaminations with unwanted yeast strains. Should this occur, discard the yeast and start over with fresh yeast.