

# Using a pot still vs a column still

By Shane Baker

To distill a quality high-wine suitable for Kentucky Bourbon, it needs to be double-distilled and have the proper cuts made, keeping the right amount of flavor from the mixture of alcohols and congeners and avoiding the congeners that make it taste bad from a pot still or a column still. In this month's article we will focus on the difference between pot still distillation and column still distillation.

Here at Wilderness Trail Distillery, we have both types of copper stills: a 250-gallon hybrid pot still and two continuous column stills; an 18-inch diameter column with 250-gallon doubler and a 36-inch diameter column with a 500-gallon doubler. All copper stills are important when mashing with grain to remove sulfur components from the distillate vapor. All of our spirits made from 2013 to mid-2016, were on our copper pot still. Since then we mainly use our pot still for our Harvest Rum and third distillation on our Blue Heron Vodka, as it is double distilled through our column as a whiskey, however the majority of our whiskeys have been made on our copper column stills since mid-2016.

Both types of stills produce great whiskeys but they do make different *profiles* of spirits and have both advantages and disadvantages, and these aren't the only types of stills you can use. Let's look at the terminology of just the pot & column stills and their design purpose.

In simplest of terms;

- Pot stills are batch distillation
- Column stills are continuous distillation

Pot stills are "batch" production with slower distillation rates and less overall efficiency, but they offer a lot of flexibility distilling different types of spirits from whiskey, rum, brandy, gin and even vodka, however vodka requires additional rectification columns than just a pot still to distill to over 190 proof and is called a hybrid pot still. A traditional pot still (no rectification columns) would require several hundred batch runs

to reach 190 proof (95% alc/vol) for example.

### **Lots of manual control with pot stills**

Pot stills are designed such that the distiller operating the still has to load a single or partial fermenter batch into the still and then heat it up and do that over and over again for each fermenter batch. A distiller has a lot of manual control into what ends up in the final spirit. They can make the spirit lighter or heavier in congeners based on how the cuts are made from the distillation. Cuts are separated by the distiller either by taste or empirically into *foreshots*, *heads*, *hearts* and *tails* throughout as the still is heated through a batch run. *Foreshots* are discarded at the very beginning as low boiling volatiles come over, like methanol for example. *Heads*, a mixture of more low boiling volatiles like aldehydes and amyl-alcohols, will start coming over next and are collected and recycled back into the next batch to reclaim some good ethyl-alcohol that was smeared in with the heads vapor. *Hearts*, the quality ethyl-alcohol, is the main focus of the distillation. It is the most abundant alcohol to collect and will last for about 80%+ of the time of distillation. Near the end of distillation in a pot still, the alcohol is about gone, the boiling point is a lot higher than from the start, which volatizes more than just alcohol called the *tails*. *Tails* are very grainy and astringent congeners that will start to volatize as the temperature in the pot is increased to keep the pot boiling near the end of the run.

The result from a pot still is a more complex flavor mixture of all of the alcohols created and some smearing of the other volatiles. It can be a single, double or triple distillation but each time the process has to start over. A pot still can produce a partial, 1, 2 or multiple barrels per batch depending on the size of the actual pot still. The consistency of the taste depends upon the distiller making proper cuts and proper operating temperatures of the still and is slightly more difficult to be consistent. It costs more per proof gallon to produce on a pot still because of the batch production.

### **Continuous column stills can run 24/7**

Column distillation can also be batch production but 99% of the time is set up for continuous double distillation with Kentucky Bourbon Whiskey. Continuous means it

can keep running as long as you have finished beer/mash to pump to it. Running a continuous column still 24/7 is very common to keep the column still in balance efficiently. Double-distillation means that after the first pass (single distillation of 125 proof in the tall column), the low wine flows directly into a doubler (large pot still) and is distilled again (doubled) to around 135-137 proof real time. So as long as you are pumping finished beer/mash to the column, it will continuously produce a consistent quality high wine (135 proof) from the doubler and will be ready for proofing and barreling.

The continuous column still design is very efficient in stripping out nearly 100% of the hearts — ethyl-alcohol — and separating out all of the poor alcohols, such as foreshots, heads and tails. These production parameters are also set by the distiller but only once in order to set up the proper vapor temperatures throughout the still to reach the proper consistent quality. As long as the incoming finished beer/mash is the roughly the same, the still parameters remain the same (beer feed, steam rate, pressure, etc.), thus producing constant quality distillate.

Our 18-inch and 36-inch column stills are pumped beer/mash at rates of 11 gpm to 42 gpm (gallons per minute) respectively, about the 5<sup>th</sup> plate down from the top and cascades down the copper stripping plates below to the bottom of the still where it is pumped out to our stillage tanks for farmers to feed cattle. Boiling points of all volatiles (alcohol, congeners, acids, esters, etc) are all different. They separate at different levels within the column, some at the top, middle or bottom and a portion of some always go over with the ethyl-alcohol vapor. The *foreshots* and *heads* are separated by venting them outside from the still by not being allowed to condense with the low wine vapor. That is accomplished by keeping the low wine hot to a certain temperature and it helps being hot when it flows into the doubler to be “double distilled”. A really cool chemistry event involving the change in boiling points from about everything but the *hearts* (ethyl alcohol) takes place in the doubler. Basically, the *hearts* and *tails* arrive together as a low wine but the *hearts* will volatize (boil out) at a much lower temperature than the *tails*, which in the presence of higher alcohol percentages will increase the tails boiling point. The *hearts* are distilled from the doubler around 189 F producing a 135 proof (67.5 % alc/vol) distillate. The tails remain

in the doubler liquid and do not come out in the vapor. We send the doubler bottoms back to the beer well to be recycled back through the still again before ultimately discarding it each week from concentrating up with tails.

### **More efficiency with column stills**

Column distillations are arguably well known for actually producing a better consistent-quality distillate. They are more efficient and do a better job of separating the different alcohols and congeners than pot stills. That can be an arguable point but we can attest that our pot still makes excellent Bourbon. Our first release of our Bottled in Bond came from our pot still. We can also go on record that if you enjoyed our Kentucky Straight Bourbon from our pot still, you are going to love our Kentucky Straight Bourbon from our column still.