



AD

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AMERICAN DISTILLER: A SOURCE OF INFORMATION ON THE DISTILLING PROCESS

The American Distilling Institute

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The ADI is the collective voice of the new generation of progressive beverage, medical and aromatic distillers, and is dedicated to the mission of disseminating professional information on the distilling process. The ADI has filed for a designation as a 501(c) Non Profit Corporation.

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Distilling

Scotch Whisky Production vs. the Brewing Process

by Graham Stewart

Similarities and Differences

The previous article in this series discussed how the production of Scotch whisky is very closely regulated by the Scotch Whisky Act of 1988. The only country where the production of beer is as closely regulated is Germany, with its Purity Law of 1516. Malt and grain spirit are mashed, fermented, distilled and matured separately, whereas in brewing, malt and adjuncts are usually processed together to produce a single malt.

In Scotch whisky production, higher diastatic power (DP) malts are employed. Extract, attenuation and carbohydrate-to-alcohol efficiencies are critical. Wort for spirit is unboiled, with no trub removal or cold break. As a consequence, this wort is not sterile, being contaminated with bacteria, mycelial fungi and wild yeasts. Spent grains are not removed from the grain wort but are removed (with a mash tun, lauter tun or mash filter) from spirit wort. Hops are not employed in the production of whisky.

Generally only strains of *Saccharomyces cerevisiae* (ale type) are employed for the fermentation of whisky wort. This includes spent brewer's yeast and "special" strains of



Image by Adam McLean

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The Basis of North American Whiskies

by Alan S. Dikty

North American Whiskey Regions

United States

Kentucky produces all types of North American whiskies except for Tennessee and Canadian. It has the largest concentration of distilleries on the continent.

Tennessee started out as bourbon country, but today its two remaining distilleries specialize in the distinctive Tennessee style of whiskey.

Other states—primarily **Indiana, Illinois, Virginia** and **Missouri**—have distilleries that produce straight whiskeys, although some of these plants are currently mothballed. **California** has one tiny micro-distillery that produces rye and another that makes malt whiskey. **Oregon** currently has two small distilleries in the Portland area which produce whiskey. Additionally there are a number of distilling plants scattered around the country that rectify (re-distill), process and bottle spirits that were originally distilled elsewhere. These distilleries, in addition to sometimes bottling bourbon that has been shipped to them in bulk, may also create their own blended whiskies. These whiskies tend to be relatively inexpensive “well” brands that are sold mainly to taverns and bars for making mixed drinks.

Canada

Ontario has the largest concentration of whisky distilleries in Canada, three. **Alberta** has two and **Manitoba, Quebec** and **Nova Scotia** each have one. With the exception of Glenora in Nova Scotia, which is a malt whisky distillery, all of the Canadian distilleries produce only blended Canadian whisky.

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A Whiskey Lexicon

Bonded Whiskey is bourbon from a single distillery that was produced in a single “season” and then aged for at least four years in a government-supervised “bonded” warehouse. Distillers originally did this in order to avoid having to pay the excise tax until the whiskey was aged and ready for market. Consumers came to (erroneously) regard the “bottled in bond” designation as a statement of quality. Bonded whiskies are not much of a factor in today’s market, although they still exist.

The Mash is the mix of crushed grain (including some malt that contains enzymes to break down grain starches

into sugars) and hot water from which the distiller draws a liquid extract called wort. The wort is fermented into a simple beer called the wash, which is then distilled.

Sour Mash is the fermentation process by which a percentage of a previous fermentation is added to a new batch as a “starter” to get the fermentation going and maintain a level of consistency from batch to batch. A sweet mash means that only fresh yeast is added to a new batch to start fermentation.

Straight Whiskey is unblended whiskey that contains no neutral spirit. Bourbon, Tennessee, rye and corn whiskey are straight whiskies. There is also a spirit, simply called “straight whiskey,” that is made from a mixture of grains, none of which accounts for 51% of the mash bill.



Alan Dikty is vice president at Applied Beverage Technologies, Inc. in Chicago, IL and contributing editor at Tastings.com.

DISTILLING — CONTINUED FROM PAGE 1

yeast that can metabolise small dextrins (maltotetraose, maltopentose, etc). Fermentation is conducted at higher temperatures than with brewing (25–32°C), in different geometry fermenters. At the end of fermentation, the yeast is not moved or recycled from the wash; it goes directly into the wash still or the Coffey still.

The fermented wort (wash) is distilled, and a plethora of flavour congeners result in the distillate. This distillate is matured for a considerably longer period than in brewing (years, not days or weeks), and this occurs in oak casks. As with breweries that use high-gravity techniques, the distillate is diluted to an agreed alcohol specification (a minimum of 40% abv for Scotch whisky) at the end of the maturation period, but the characteristics of the dilution water employed are different. The final whisky in the bottle is far more stable than beer. There are no dissolved oxygen, light, foam or microbiological-stability problems. However, as with beer, haze formation can be a problem.

Both industries have strengths and weaknesses, and each can learn from the other. As already described, the Scotch whisky industry closely and jealously protects its heritage and tradition. The Scotch Whisky Act is the focus of this tradition, and the malt distilleries have developed the appropriate

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atmosphere, PR facilities and locations. Many (though not all) large breweries have lost this tradition, to their detriment. However, smaller brewing companies (such as the independent, family-owned breweries in the United Kingdom, and the microbreweries in North America and Japan) are striving to present an image of conservatism and tradition.

In conclusion, the Scotch whisky industry process has a number of differences with brewing, in addition to distillation of the fermented wort (wash). A brewery has traditionally been an integrated operation containing all the processes essential to brewing: fermenting, maturing, filtering, packaging and distributing the beer into the marketplace, or at least to a distribution depot. In contrast, an individual distillery is, for most of its output, but one of a number of feeder units supplying a selection of blends that formulate and package the final whisky. In recent years, however, the “standalone” operation of many breweries is changing, with beer being brewed in one location and tankered to another where it is blended, diluted and packaged.

The next article will discuss the maturation of Scotch whisky and compare it to the beer maturation systems.

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Graham G. Stewart writes to us from the International Centre for Brewing and Distilling, Heriot-Watt University, Edinburgh, Scotland.

SLOBBER BOX

- ◆ Kudos to: **Westford Hills Distillery** in Ashford, Connecticut. They were mentioned as one of the best 100 things about food and beverage in *Savour* magazine.
- ◆ Kudos, also, to: Sam at **Dogfish Head Brewery** in Rehoboth Beach, Delaware for getting his distillery open and his first batch of Brown Honey Rum.
- ◆ Not to be forgotten: **RMS Brandy Distiller** flavored syrups. You can order brandy-maple syrup, chocolate sauce with brandy and caramel sauce spiked with pear de pear liqueur. For \$18.50 you can buy 12.5 ounces. www.rmsbrandy.com

Do you have praise, stories, or gossip for the Slobber Box?

Send your slobber to distilling@aol.com

Cooking with Spirits

by Lucy Saunders

BOURBON PECAN PIE

Most pecan pies call for dark corn syrup to create the caramelized goo that holds the pie filling together — instead, this recipe uses a blend of Bourbon whisky and light cane syrup for a more flavorful taste.

Makes one 9-in. pie

Crust:

1 1/4 cups all-purpose flour	1 T. white sugar
pinch of salt	1 egg yolk blended with 1T.
6 oz. unsalted butter chilled and diced	ice water until smooth
	Splash bourbon to blend

Filling

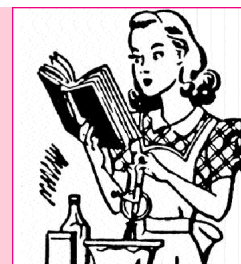
1 egg, plus one yolk, slightly beaten	1/4 t. ground nutmeg
1/2 cup light corn syrup	1 t. vanilla extract
1/4 cup brown sugar	2 T. melted butter
2 T. all-purpose flour	1/4 cup Bourbon whisky
1/4 t. salt	1-1/4 cups shelled pecans

Method:

Fit a food processor with the metal blade and blend flour, salt and butter until fine crumbs are formed. Add the sugar and egg yolk/water blend while the machine is processing, then add a splash of Bourbon (about 1 oz or 2 T.) and pulse to blend. The dough should rapidly form a clump. Stop processing as soon as a ball forms. Place a sheet of plastic wrap on the counter top and scrape the dough onto the plastic. Wrap loosely and press into a disk shape. The dough will chill more rapidly and roll more easily from this flattened disk shape.

Preheat the oven to 400 F. Roll out the pastry out on a floured surface to a large circle, about 11 inches in diameter, and line the pie tin with it. Prick the pie dough well with the tines of a fork, form a crust edge, and chill for 15 minutes.

Place pecan nutmeats into the pie shell. Whisk together all the remaining filling ingredients until smooth, then pour over nuts into pie shell. Bake at 400F for 10 minutes, then reduce heat to 350 F and bake for another 45-50 minutes, or until the filling is set. Let cool completely before slicing and serving. Yields 8 servings.



The History, Development and Operation of the Alambic Pot Still

by Don Outterson

When Bill Owens asked me to do a series of columns on distilling, I thought the best way to start would be with a developmental approach for both myself and the subject. I am the owner of a small distillery and winery in Ohio, "registered to practice on alcohol matters" before the BATF. I am a diploma graduate of both the Alltech Alcohol School and Siebel Institute. As a life-long student of fermentation technology, I have longed for a venue where breweries, wineries and distilleries can share information. Hopefully, American Distiller will be that forum. I'll begin by investigating the history of distilling.

The alambic (also called alembic) pot still was the first and original type of still ever invented. This basic rendering and concentrating apparatus was small, portable and highly adaptable. It was easy to clean with no internal plumbing. The hot side could be made out of any local material capable of creating a pot for boiling water.

The origin of the pot still goes back to 800 B.C. in China with the manufacture of a rice distillate called "tehoo saut-choo"¹. The pot still's next products are found in the Arabian countries about 500 A.D., making essential oils, herbal tinctures and perfumes. In fact, the Arabic word Al Ko'hl or "the powder" (from the powdery looking first pass through the still) is the basis for the word alcohol².

The pot still's route to Europe was three-fold. Silk trade routes of the Kahn empire ran from China to central Europe. In addition to silk and spices, stills and distillation products were among the many items traded East to West throughout the entire duration of the empire. Next, Crusaders returning from the Middle East brought distillation technology back to Rome and Europe with them. Finally, Catholic priests and monks from Rome (who were literate and even former crusaders) brought the new technology with them as they "Christianized" Europe.

The success of the pot still lies in the simplicity of its design. On the outside of the still, a single closed metal vessel with a "swan neck" is connected to a serpentine coil in a bucket. The vessel is filled with fermented beverage and a fire was started underneath to bring the liquid to a boil. As the boil lasts at least three hours, cold water is slowly added to the bucket as that water warms. The distillate now exits through a lower tube and has completed a single pass, often called "1x" (the "xxx" on the side of moonshine jugs meant three passes on the pot still.)

Inside the pot still, the distillate evaporates at the top of the vessel and condenses back to liquid within the cooled coil. It then exits as a liquid (again) into a closed collection container (1x) for further processing.

The ancient pot-stilling process was operated without any thermometers or hydrometers, so most settings were made around limitations of the individual still, before any yield or flavor considerations. Pot-stilling styles and products were developed by the availability of local crops. In France, grape wines were distilled for export by inland cities. In Scotland, malt beverages were distilled in the Highlands for export to England. This practice became the basis for many of today's distilling traditions.

Successive pot still passes were found to concentrate the alcohol even further and were employed quickly as a concentration technique for taking to market products that otherwise could not last the journey. Traditionally, two pot still passes are used in Scotland, whereas three passes are used in Ireland.

Armagnac (which is traditionally distilled only once) is the oldest known wine spirit having been produced without interruption since 1411. The first known treatise on distilling was written about 1310 by French chemist Arnaud de Villeneuve.

The classic pot still design and process remains essentially unchanged today, with four notable exceptions: the entire pot still is now made of copper; a thermometer has been added to the boiling vessel; running water is used for cooling; and hydrometers are employed to measure the stills output.

These developments brought the laws of science to the art of distilling. They gave quality control to the pot-stilling process, allowing alcohol strength and flavor measurement for the first time. They also defined classical "spirit cuts" by hydrometer readings with each pass number. At this point (much to their dismay), distillers discovered that after three or four successive passes on the pot still, the hydrometer showed no

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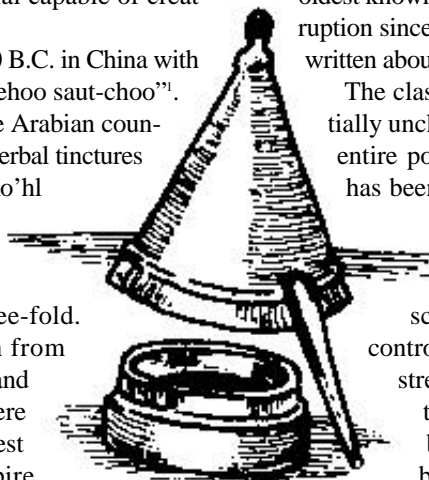


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- **Worldwide Distilled Spirits Conference.** Sept. 8-12, 2002 at Roxburghe Hotel in Edinburgh, Scotland. www.distillingconferences.com.

Spirit Review

by Alan Moen

Bourbons from Heaven Hill and Brown - Forman

Evan Williams Single Barrel Bourbon Whiskey Vintage 1992, barrel 01 (nine years old), 43.3 ABV, \$24.99 – Medium



golden amber (darker than the 1991.) Big, oaky, slightly smoky nose and huge depth of flavor with sweet oak, maple, vanilla, alcohol and tannins. Powerful finish with great lingering warmth and sweetness. A fabulous whiskey, rich as a Macallan Scotch. **Outstanding. **** AD BEST VALUE.**

Henry McKenna Single Barrel Bourbon Whiskey 1990, barrel 162 (10 years old), 50.0 ABV, \$27.99 – Medium golden amber, sweet maple/woody nose, vanilla, maple sugar and oak tannin flavors with ample alcohol, quite warm but very smooth, mellow finish. Extremely drinkable and well made. ***

Elijah Craig 18-Year Old Single Barrel Bourbon Whiskey, 45 ABV, barrel 509, \$35.99 – Medium golden amber. Complex

sweet oaky nose. Rich mouthfeel with sweet vanilla and woody flavors, and warm, lingering, rounded finish. A very good, characterful bourbon, the oldest available on the market. ***1/2

Elijah Craig Small Batch Kentucky Straight Bourbon Whiskey, 47 ABV, (12 years old), \$17.99 – Medium golden amber. Very sweet, slightly volatile aroma. Pleasant sugary, woody flavors with some sharpness and heat in the finish. A well-made, solid Kentucky whiskey. **1/2

Fighting Cock Kentucky Straight Bourbon Whiskey (six years old), 51.5 ABV, \$15.99 – Medium golden amber. Woody, alcoholic nose. Fairly simple, sweet oak and alcohol flavors with some depth and a rather hot finish. A pleasingly potent, although not very complex bourbon. **1/2

Labrot & Graham Woodford Reserve Distiller's Select, 45.2 ABV. \$29.95 – Pale golden amber. Fairly intense, sweet vanilla nose with slight volatility and some woody overtones. Medium mouthfeel with complex sweetness and oak flavors. Very fine, rich, warm finish. Excellent, stylish whiskey. *** 1/2 **AD BEST VALUE.**

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ALAMBIC POT STILL – CONTINUED FROM PAGE 4

increase in alcohol! They discovered Alcohol's azeotrope (point of diminishing returns) to be 97.2 percent ABV or 194.4 Proof. Wanting to save time and fuel, the early distillers sought out the highest and best use of their agricultural products through concentration with no more than several passes.

The concentrated product of their stills was known by many names (Eau-de-Vie, Usquaebach, Uisge Beatha, Aqua Vini, Aquitane, Aqua Vitae, Akvavit, Aquavit) as "the water of life". Even though the true nature of this microbial life form would not be revealed until Pasteur's studies 400 years later, the early distillers' practical experience had taught them where the life force was, even though they didn't understand it.

Today, the highest quality of Scotch and Irish whisky are "still" made using an alambic or pot still, where the true natural flavors of the wort are imparted to the spirits produced. High quality raw materials are required. The spirit cut and flavor ranges can also vary with temperature, yeast, bacterial infection, weather and/or quality of the supplier. So, it is imperative for the distiller to have a complete and continuing analysis from all suppliers.

The art of the pot still operation is its flexibility. The flavor congeners (impurities) are normally obtained by a deviation from the classical spirit cuts of 1x to 18 percent ABV, 2x to 80 percent-70 percent ABV. The danger is that beyond those few points also lie unforgiving rancid oil congeners which can spoil the entire batch. The spirit cut itself—pure ethanol from

the middle of the distillation—is generally constant, but often small. Distillers are often tempted to get every last drop out of the "good range" before collecting "tails" from the end of the run for the next pass.

The distiller's art and skill are required to know all of the determining factors of his work and their variables. These factors are applied to yield the most distinctive organoleptic qualities for each distillery. For this reason, the pot still is exclusively used by flavor-conscious distillers for Armagnac, Cognac, Eau de Vie, Schnapps Brandy, and Whisk(e)y. It is also for this reason that pot stills are generally not used for so-called "neutral spirits" such as vodka, gin, white whiskey, and white brandy. The use of a pot still is the qualitative difference between a blended Scotch and a single malt Scotch.

The pot still is the "noble" still. When used with "noble" ingredients it will yield the greatest alcoholic beverages known to man or woman. It was only the greater efficiency of the column still with its ability to produce neutral spirits—never the greater quality of its beverage alcohol—that caused the decline of the use of pot stills for the mass production of distilled spirits.

References

¹ Hannum, *Brandies and Liqueurs of the World*, p. 5, Hillman, *The Gourmet Guide to Beer*, p. 248

² "Alcohol", Encyclopaedia Britannica.

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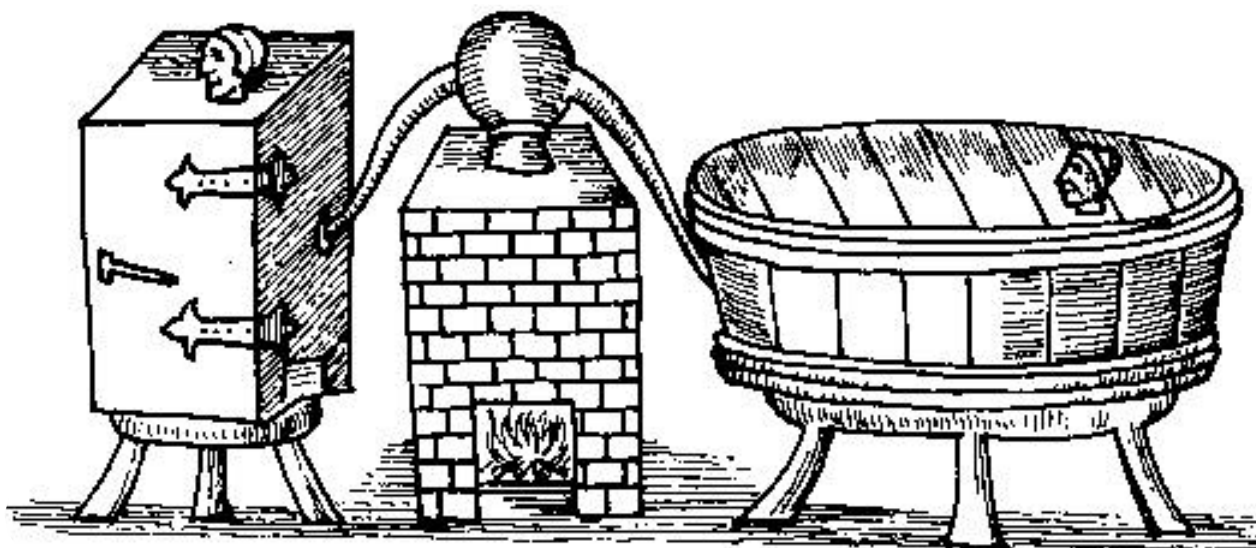


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