White Wines, New Barrels: The taste of new oak gains favor worldwide

By Daniel Sogg

Vanilla. Honey and caramel. Coconut, cinnamon and cloves. Once chiefly associated with baked goods, these flavors, resulting from fermentation and aging in new-oak barrels, are increasingly popular in white wines. In particular, the commercial success of oaky Chardonnays has helped establish the lavish use of new oak as a style template that today defines many of the world's white wines.

The hegemony of new oak is a recent phenomenon, however. Over the years, producers have used other trees, such as pine, chestnut and redwood, to ferment and age their wines, but none of these rival oak's combination of mechanical and sensory qualities. Older oak vessels, which impart little if any wood flavor, have long been used to ferment and store wines. Neutral oak tanks, along with stainless steel tanks, are still preferred

by the vast majority of white-wine makers in Germany and Alsace, as well as by many producers in Italy, Spain and France. In California, widespread barrel fermentation of whites is a fairly recent development. "In 1981 [when we started Saintsbury in Carneros], there were not many barrel-fermented, complete malolactic Chardonnays," says winery co-founder Richard Ward.

The current model of oak-infused white wines derives from Burgundy. While many wines there were traditionally fermented in small oak barrels, the use of new oak was reserved for the most respected and expensive wines. In consequence, new-oak flavors became associated with the prestige of the grands crus. With the economic prosperity of the '80s and '90s, more Burgundians could afford new oak for a wider range of wines.

Today, new barrels are a fixture in virtually every respected domaine in Burgundy, with estates using more new oak for their costlier wines. That same approach has been transplanted to California and other New World regions, where the most expensive, "reserve" designated Chardonnays typically receive a higher proportion of new-barrel fermentation.

New barrels vary dramatically in cost and in the flavors they impart, depending on the species of oak, the growing conditions of the tree, and the production techniques of the cooper. French oak barrels have traditionally been considered the most desirable, partly for the their mellow rich flavors, but also because of the experience of French coopers. As a result, new French barrels come at a premium, costing as much as $700 apiece, as opposed to $300 for a barrel made from the American oak species.

Domestic barrels were once used almost exclusively by the whiskey industry.

Quality has improved dramatically over the last five years as American coopers have borrowed and adapted French production techniques. But some flavors are determined by the species of oak, with high-quality French oak imparting subtler

flavors that sometimes seem to harmonize better with wine. One reason for this is a difference in the amount of lactones -- esters that account for the coconut and vanilla overtones -- between American and French oak. American species typically impart more intense flavors because they have two to four times the lactones that French species have. However, the aggressiveness of these flavors can be mitigated by extended air-drying of the staves and judicious toasting. Unpleasant dill notes, once considered a telltale sign of American oak, are a result of poorly cured and toasted staves.

Some coopers, concerned by the supply and cost of French oak, are also looking to forests in Eastern Europe. The trees are of the same species of oak found in France, and barrel quality can be very high. There are also less expensive ways to impart oaky flavors to white wines, including the use of oak chips. But using chips is a cost-reducing shortcut that provides a wine with superficial makeup rather than real structural enhancement.

Wines fermented and aged in new barrels tend to absorb two primary categories of oak flavors: lactones, and caramelized, smoky notes, such as mocha and toffee, created by the charring, or "toasting," of barrel staves. Coopers offer varying levels of toast -- light, medium, medium-plus or heavy. Oak staves contain large quantities of polysaccharides, so heavier toast emphasizes sweeter flavors while also accentuating vanilla. The risk is that excessive oak flavors will overwhelm a wine's varietal character. When grapes have enough concentration, however, new barrel fermentation yields compelling white wines. "It gives richness and roundness, and at the same time, vinification in barrel happens more gently," says Rhône winemaker Yves Cuilleron, who uses 30 percent new oak to ferment his wines from 61 acres of Condrieu. Use of multiple small barrels also ensures more complexity than fermentation in a single large tank. Each barrel is distinctive, with variations in the composition of the staves and toast level that affect the fermentation and resulting flavors.

Barrel fermentation also turns out to be the best way of harmonizing the oak with the wine. Yeast does far more than convert grape sugar into alcohol and carbon dioxide; it also tempers the oak's influence. Flavor components from the wood leach into the wine, and the yeast metabolizes these wood compounds, converting them into subtler flavors and aromas. Yeast is also a fining agent, eliminating some of the astringent wood tannins that the wine absorbs from new barrels.

Napa winemaker John Kongsgaard, who uses 100 percent new oak for fermentation of Chardonnay, but 10 percent for Pinot Grigio, favors barrel fermentation with natural yeast. "[Unlike cultured yeast] their fermentation takes a long time to start and finish. So at that point they're taking time making something other than alcohol. Those by-products of yeast activity are what gives the wine extra interest and extra richness," he says.

Fermentation in barrels also concentrates wines via the evaporation of water and alcohol through the pores of the wood. In very humid cellars, wines in barrel lose alcohol. Drier conditions reduce water content. Most high-end Chardonnays spend about a year in barrel and typically lose about 4 percent in volume.

Producers emphasize that flavors from oak are only part of the equation. "The tendency in the New World is to think of the barrel only as an oak flavoring agent, and that isn't the case," says Ramey Wine Cellars owner and winemaker David Ramey, who has been making Chardonnay for 23 years. Oxygen gradually seeping through the staves rounds out and enriches the wine, making it more flattering when the time comes for bottling.

Primary (alcoholic) fermentation usually lasts less than one month. Over the last 15 years, many winemakers have also put their Chardonnays (and many other whites) through secondary fermentation in barrel, whereby bacteria convert tart malic acid into creamier lactic acid, which gives the wine more richness in the mouth. The process can take a couple of weeks (with inoculated bacteria) or many months. Like yeast, the malolactic bacteria are also thought to metabolize oak compounds, giving better-integrated flavors.

Barrels are convenient for bâtonnage, the stirring of the lees that accumulate after fermentation. Frequent bâtonnage extracts the naturally nutty flavors of the yeast, and it also maximizes the yeast's role as a buffer of the wood flavors.

More new oak does not necessarily translate into more overt oak character, however. That depends on the barrels. Some producers, such as Kistler in Sonoma, Au Bon Climat in Santa Barbara and Burgundy's Domaine de la Romanée Conti, like barrels made from staves that have been air-dried 36 months, rather than the more typical 10 to 24 months. Longer air-drying softens and mellows the oak flavors. Kongsgaard, who leaves his Chardonnay in barrel for 20 months, thinks that the more pronounced spiciness of two-year staves works better with his Napa vineyards.

Few topics are guaranteed to provoke more strident disagreement between wine lovers than how much oak is too much. It comes down to personal preference, as well as the soundness of a producer's judgment. Barrel fermentation in new oak yields many of the world's best and most popular whites. So winemakers, and their accountants, are certain to stick with a recipe that yields such success. But what works for superior grapes from special sites doesn't necessarily translate to all white varieties or less-inspired vineyards.

Richard Ward, whose success at Saintsbury helped popularize barrel fermentation in new oak, would welcome more diversity. "I think there's a lack of stylistic differences in California white wine in general," he says. "As we become more mature as producers, growers and drinkers, we can hope there will be more variety, and it will be recognized by the wine-drinking public."

How Barrels are Made

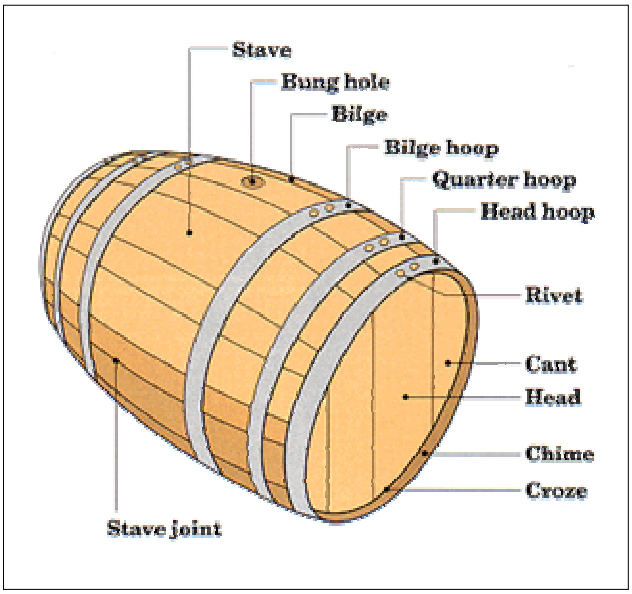
The art of barrel making, known as cooperage, is an ancient skill. Despite improvement from modern research, analysis, machinery and wood selection techniques, the actual barrel making process has changed very little over the years and is extremely time intensive. To achieve the highest standards of quality, most of the work must still be done by hand by a highly skilled cooper. The following information is

adapted from the famous French cooperage Seguin Moreau, where many premium California wineries ... including Clos du Bois ... source French oak barrels.

Every season, when trees are felled, experts from the cooperage are on hand to select the best oak wood for use in the manufacture of barrels and vats. This selection is the initial phase that essentially determines the quality of the finished product.

The oak is examined both before and after being cut, and wood is selected based on many criteria, including tree shape and growing conditions. These factors determine the textural variety of wood fibers, the fineness of its grain and its tannin content. Tight grain and fine tannin content are found in the best wood.

The logs must be hand split to preserve wood grain without breaking wood veins, which is essential for creating impermeable barrels. The oak log is first split in two, then into quarters to obtain wood for the oak staves (called merrain). After splitting and planing, the stave wood is stored outside in tiers. Exposed to air and water, the wood is naturally aged by the weather for several years. During the aging process, the development of sugars and acids are monitored.



After aging, the staves are formed by machines into the proper shape and form for barrel assembly. After they are cut to the proper length, they are tapered at each end and beveled. Then they are planed on the outside, slightly hollowed on the inside and jointed by high precision machining.

After being inspected and selected, the staves are given to a cooper for assembly. At this essential stage of the manufacturing process, man steps in. The craftsman with irreplaceable experience and, above all, appreciation for work well done now adds his personal touch. The sharp-eyed cooper selects his staves, setting aside those that do not suit him. Then he assembles the staves inside a metal hoop that serves as the assembly jig. This operation, so spectacular in its speed and precision, is what the cooper calls the "mise en rose" or "raising the barrel."

Solidly held in place by three metal hoops that have been forced into place, the "rose" is then subjected to a trial by water and fire in the workshop, where it takes its final shape. Repeating movements that are part of the most ancient tradition of his art, the cooper seals joints by passing a wet cloth inside and outside the staves, then heating the barrel over a wood fire for approximately 30 minutes. Rendered flexible by heat and humidity, the wood fiber can now be bent by the cooper, who uses a winch to gradually arch the staves and tighten them to obtain the shape of the barrel body. The body is held trussed in place like this until the metal hoops are definitely placed.

The length of heating results in a "toast level" on which the flavors of the wine aged in the barrel will partially depend. During the heating of the staves, some substances of the wood are caramelized and develop a multitude of aromas, such as vanilla, fresh bread, buttered bread, or a touch of nut, that will be found in the final taste of the wine. Toast level will be adjusted according to the customers' requests: light, medium or heavy toast.

After the bending and heating of the staves, a very precise machining step is necessary to trim the ends of the staves and to cut the "croze," the groove in the staves that receives the barrel heads. Custom cut to fit the croze, the heads are produced with every respect of the most traditional rules for barrel making. Parts are assembled exclusively with dowels and natural, soft, flexible and rot-proof river reed to provide a perfect seal.

The cooper then finishes the assembly of his barrel. The body is set up and the heads fitted into the crozes that have been coated with a paste of wheat flour. Then comes the final hooping, put in place with a large mallet.

Once the barrel is finished, a rigorous test of impermeability is made, by pouring a small amount of hot water under pressure into the barrel. This procedure makes it possible to immediately detect any leaks, or mere traces of moisture caused by an unusually porous areas or manufacturing defect.

After the barrel is inspected and passed, the cooper does the final finishing work, planing and sand-papering to enhance the quality of the oak used and the perfection of the workmanship. His work finished, the master craftsman signs his name on the barrel, a custom that has existed throughout the history of French barrel making.

You may notice that both French and American oak barrels are used to age many wines. While the barrel making process is similar for each, the wood imparts different characteristics to the wine being aged. Winemakers may choose a combination of the two to achieve a particular effect in the finished wine.

What's the difference between French and American oak? Simply put, French oak adds more subtle flavor to wine, while American oak is more aggressively flavored. Once again, the use of French and American barrels of various ages provides a broad spectrum aromas, flavors, and textures to the blend, in much the same way as cooking with many ingredients improves the flavor of food.

In the past, American barrels were known to be overly aggressive, which was blamed on the character of the wood itself. It was then learned that the methods used to make barrels in America, while suitable for whiskey, were leaving too much flavoring in the wood. When American coopers began applying French methods to American oak, the resulting barrels, while still more powerful than the French, were very well suited for wine. To clarify:

French Method:
Air Dried Wood

Split Staves
Toasted Inside

American Whiskey Barrel:
Kiln Dried Wood
Sawn Staves
Charred Inside

Old American Wine Barrel:
Kiln Dried Wood
Sawn Staves
Raw Inside

Modern American Wine Barrel:
Air Dried Wood
Sawn Staves
Toasted Inside

Air drying of stave wood outside softens the barrel tannins. The gentle toasting of the inside of the barrel changes the physical and chemical properties of the wood. The heat caramelizes sugars in the wood, giving rise to new compounds which add complexity. The toasted wood also acts as a buffer between the wine and the raw wood underneath. Both barrels in this exercise have "medium" toast. On the inside, they have the color of cocoa.

Although American barrels are now made from air dried wood, stave wood is sawn from the trunk, rather than split, because American oak has its internal vessels more thoroughly plugged with structures called tyloses (tie-lows-es). French oak has far fewer tyloses and tends to leak if sawn. An advantage of sawing is that more staves can be made from each trunk.

American oak barrels have made remarkable progress in terms of quality since 1990. The differences between many American barrels and French barrels is now a matter of style. At many wineries, the character of each type of barrel is used in the same way as seasonings are used to enhance the flavor and texture of gourmet food.

The capacity of a barrel comes from both practical experience and historical 'capacity'. A generally agreed assumption relates the volume of the barrel to the amount of grapes harvested from a set piece of land. The 225 liter Bordeaux barrel is the most widely used size today and its common name is the barrique. The Borgogne (at one time found only in Burgundy) is 228 liters in capacity and slightly shorter and wider than the Bordeaux while still have the robust 27 mm staves. A Hogshead is around 300 liters while a Puncheon is around 400 liters in capacity. Each cooper may have their own variations in sizes, but the traditional Bordeaux and Borgogne barrels will be found anywhere.