BARRELS, BARREL ADJUNCTS, AND ALTERNATIVES

Section 3.

Barrel Adjuncts

While the influence of oak and oxygen has traditionally been accomplished through the use of oak containers, there are alternatives. Stainless steel tanks and older barrels can be loaded with oak staves and/or “tea bags” of chips, beans, and/or granulated or powdered products which allow a winemaker to select the amount and timing of oak extraction into wines. Furthermore, the advent of micro-oxygenation is known to impact structural/textural integrations of phenols, possibly resulting in increased color and stability, and diminished vegetal characters.

Oak barrel expenditures can be the largest cost element in wine production. Alternative oak products (barrel adjuncts) are available in a variety of sizes and toast levels, obtained from French, American, and Hungarian sources. Adjuncts are frequently marketed in terms of specific oak sensory attributes that a winemaker wishes to emphasize in his or her wines.

Toasted oak of granular or powder size has been successfully used prior to and during fermentation, to lower the perception of vegetal overtones and reduce astringency, without adding typical oak character. The size of granules or chips

affects the extraction rate, with small sizes extracting more quickly. Winemakers may choose to use smaller-sized products during fermentation, due to their enhanced extraction rate and ease of processing, and larger-sized products during aging and finishing.

Tank staves are commercially available in a number of horizontal and vertical configurations for fitting into fermentation or aging tanks. Due to their size and thickness, staves generally are used for the slow extraction of oak components. At usage times involving four or more months, these provide an aging process that is more similar to that achieved with a barrel.

Barrel inserts may economically add new oak character to a depleted barrel. A “kit” of inserts typically provides the equivalent surface area to that of the barrel into which it is inserted. As with other products, these inserts can be sourced from air-dried French (or European) and American oak, toasted to various desired levels. While some kits are inserted through the bung and float relatively freely inside the barrel, other kits require head removal. The staves may be anchored inside the barrel to keep them in a specific configuration.

While powdered or granular oak and chips are single-use products, tank staves and barrel inserts may well be used for a year or so, and with multiple fills. It is important to be aware that these staves and inserts have the same cleaning and sanitation requirements as do tanks and barrels. Complicating the cleaning and sanitation concerns is the fact that staves and inserts may be configured to take advantage of toasting on both sides.

Such configurations generally do not mimic the continuous inside surface of a tank or barrel, and cleaning and sanitation techniques that work for tanks and barrels may not be adequate. A winery must confirm that its cleaning processes, that adequately remove tartrates from its tanks and barrels, also work with the

staves and/or inserts it uses. The same concerns apply to the use of sanitation processes.

Practical Considerations for Oak Alternatives

Barrels have the advantages of helping to create a positive image of tradition and know-how. They are associated with wine quality and complexity. In a practical sense however, they are expensive, use a significant floor space, represent some sanitation challenges, and can be highly inconsistent from one to another.

Of increasing concern is the fact that barrel use is not sustainable. A French barrel may be made from a 200-year-old tree planted by Napoleon. When the bark is stripped away, the premium wood remaining yields about 25% staves for barrels, and the remainder of the perfectly good wood is discarded.

The advantages of oak alternatives include the following:

- low cost
- versatile
- easy to use
- space savings
- no maintenance
- can be more consistent than barrels and therefore easier to predict results

Kept cool and dry, oak alternatives will keep for years. The same problems existing in barrels (environmental taint, TCA, etc.) are of concern. Powders are used during fermentation, while chips and staves can be used during or post-fermentation. The generalized disadvantage of oak alternatives include the possible negative image of not using a traditional tool such as barrels.

Tank inserts of 2 to 3 meters have the following attributes:

Pros

- Easy to clean.
- May not require welding.
- Used at all stages of winemaking.
- Product choice (sources, age of wood, toasting levels).

Cons

- Expensive wood cost.
- Hardware elaborate and time consuming.
    - Frame construction complex.
- Installation complicated and time consuming.
    - ladders
    - multiple personnel
- Staves can loosen in tank.
- Hardware may require dedicated tank.

Vertical three-tier-type systems of wood slats inserted into wine tanks are used by some. They have the following attributes:

Pros

- Versatile for fermentation, aging, and finishing.
- Installation is quick and simple.
- Hardware is inexpensive and not complicated.
- Easy to clean.
- Inexpensive.
- Can be attached to other frames that pre-exist inside tank.

Cons

- Limited in the number of staves, low dose rate.
- Requires ladders and multiple personnel to install.
- Welding required.

Wood cubes are popular oak barrel alternatives that have the following attributes:

Pros

- No installation costs.
- No hardware involved.
- Large quantity of wood surface area can be added.

Cons

- Determination of the surface area added may not be easy.

Practical Summary of Winemaking Issues

- European oak can provide almost two times the ellagic acid tannins of American white oak, making the wine more tannic.
- American white oak is two to three times richer in methyl-octalactone than European oak, adding more vanilla-type odors.
- New barrels impart considerably more oxygen into the wine than used barrels.
- Oak can provide reductive strength as a result of the high concentration of gallic acid. A common deficiency in must is the limited reductive strength, without which structural integrity, good texture and longevity are not possible.

- Oak's anti-oxidant powers are particularly important for low phenols reds, such as Pinot noir, which cannot support extensive aging without this added benefit.
- Toasting and the source of the wood affect the volatile phenol production, with compounds with smoky or spicy aroma more progressive and intense with American oak.
- Green untoasted oak contains *trans*-2-nonenol which can provide sawdust, planky-type aromas, that can persist in wines for a long time. For this reason, oak requires curing or seasoning (12 to 24 months) to help leach harsh tannins.
- Untoasted wood supplies the so-called whisky lactone (a sort of coconut element). This lactone can enhance the varietal character of many wines.
- Untoasted oak is rich in hydrolyzable tannins, such as ellagitannins, which can break down to gallic acid. Gallic acid is a strong cofactor in increasing the spectral color of red wines.
- Toasting converts hydrolyzable tannins to products that can form larger polymers that do not help increase color.
- Untoasted oak has less aromatic compounds, but more ellagic acid tannins.
- Untoasted oak may help to limit the negative influences of some sulfur-like off odor compounds, facilitating the perception of fruit.
- Toasting has the ability to break down cellulose to sugars, thus adding a sweetness factor. This is not usually perceived as sweet, per say, due to the presence of phenolic elements, but provides a fullness and added palate depth.
- Toasted oak can impart barbecue aromas which can be amplified by yeast and converted to Worcestershire aromas. However, toasting oak wood *can* increase the vanilla, toffee, and sweet elements.
- Moderate toasting usually brings out the spice elements in most oak sources.

- Heavy toasting can provide espresso-type notes that can frame the fruit, and also add a richness to the palate, as a result of the enhanced wood sugars. High temperature is usually required to create clove, spice, vanilla, caramelized, and espresso aromas.
- Fermentation in oak results in a better integration of wood aroma and polyphenols. Oak added during fermentation can provide tannins which help precipitate wine proteins and help to de-activate enzymes which may destroy color.
- Malolactic fermentation is believed to increase the release and solubility of oak aroma compounds.
- Oak alternatives used early help to manage red wine color and tannins, but provide only limited aromatics.
- Oak alternatives used during white wine fermentation may not be optimal for some varieties, such as Sauvignon blanc, with rather oxygen-labile aroma compounds.
- Wines which contain vegetal or microbial notes often benefit from the enhanced structure provided by oak. The wood can serve to integrate the wine and increase the fruit character.
- European oak high in ellagic tannins is sometimes used early to minimize enzymatic oxidation that can occur with wines produced from *Botrytis*-damaged fruit.

Study Questions

1. List some of the advantages and disadvantages of oak alternatives.

2. Is there any difference in the wood components (wood chemistry) found in barrels versus chips or cubes?

3. What is/are the differences in toasted versus untoasted wood with regard to extraction of red wine color cofactors?

4. Why would wines stored in different-size or -shaped vessels possibly have different sensory characteristics?

5. Why does the wine industry have different-shaped barrels for different types of wines?

6. One of the more progressive French producers came up with a cigar-shaped 200-L barrel for his Sauvignon blanc. Why would such a shape have an influence on wine and, specifically, on Sauvignon blanc?

7. What does the term reductive strength mean? How does oak impact this? What is the effect of an old versus new barrel on reductive strength?