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Regarding Barrel Toasting Levels

Wine aromatics from barrel storage are a result of many variables, as described in recent newsletter articles of The Midwestern Winegrower. Toasting is certainly a key variable on oak chemistry, and therefore on the quality and quantity of oaken aromatics assumed by the wine. Here's a quick summary of research done on toasting levels.

During toasting chemical bonds between the three big polymeric (chemically complex) building blocks of cellulose, hemicelluloses, and lignin are disrupted, in effect liberating flavor compounds. The extent to which such flavor compounds are formed and the precise depth (of the interior barrel surface) at which they are maximized depends largely on toasting temperature and duration of toasting. The oak density plays a role also: American oak is denser than French oak, resulting in different rates of heat penetration. (2)

The well-known flavor extractives from barrels include vanillin, toasting caramelized sugars, tannins and oak lactones; all of these exhibit color. Historically, toasted oak color has been used as an indicator of toasty flavor. Recent research has demonstrated, however, that there is not a direct correlation between flavor and color. (2)

Other research focused on identifying specific aromatics, and the coopers' abilities to reproduce aromatics that differ by toasting level. Yes, it is possible to differentiate barrel toasting levels by analyzing a certain number of aromatic compounds resulting from the toasting of oak. It is also possible to use "an

electronic nose" to differentiate between the intensities of toasting of barrels by analyzing the volatile compounds released after six 15-minute intervals of toasting. Additionally, this research found that, generally speaking, the coopers find it difficult to produce consistent "medium" toasting; and that light, medium+ or high toasting are more consistently produced. (1)

Regarding barrel sanitation, one study compared ozone treatments with hot water treatments. The ozone treatments did not show a significant change in the concentration for each of the oaken aromatics analyzed. In contrast, some oaken aromatics did demonstrate significant changes in concentrations when treated with 82 °C (180 ° F) water for 5, 10, and 15 minutes. These results support the use of ozone as a viable sanitizing agent for oak wine barrels.(3)

In another study, the effects of toast level (medium and medium plus) and volume (300 and 500 liters = 80 gallons and 132 gallons, respectively) of French oak barrels used to age Cabernet Sauvignon wines were studied for two vintages. The oak-related aroma compounds, and sensory properties of the wines were followed for 12 months to determine the final characteristics of the wines and whether the toasting-level characteristics influenced the resulting wines after aging. Results showed that wines aged in the smaller barrels with a medium+ toast level acquired more sensorially desirable characteristics, higher amounts of oak-related aroma compounds, and generally overall higher sensory analysis scores. Of course, it was also demonstrated that the aromatic characteristics of the wine cultivar influenced the subsequent aroma profile. (4)

In summary, this quick scan of available research on toasting levels indicates the following:

A. Toasting temperature and duration of toasting are key variables in providing the oaken aromatics.
B. American oak is denser than French oak, leading to different rates of heat penetration, resulting in different oaken aromatics.
C. There is not a direct correlation between flavor and color.
D. Coopers find it difficult to produce consistent "medium" toasting; light, medium+ or high toasting are more consistently produced.
E. The ozone treatments did not show a significant change in the concentration for each of the oaken aromatics analyzed, while hot water did.
F. Wines aged in the smaller barrels with a medium+ toast level acquired more sensorially desirable characteristics, higher amounts of oak-related aroma compounds, and generally overall higher sensory analysis scores…in interaction with the grape variety.

References:

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