Historical Note

A Version of the Invention of Barrels and Barrel Alternatives

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In the beginning Man, Woman, and Child were farmers. They picked grapes and made wine. On the farm were animals, one of which was the pig. Man, Woman, and Child found many uses for the pig, one of which was to hold wine. Man put fresh new wine in the pigskin, Woman warned man not to cap the snout. Man did not listen, and he capped the snout. Child carried the pigskin of fresh wine into the cave for cool storage, but the pigskin began to balloon, and holding the pigskin was too difficult for Child. Child dropped the pigskin and it blew open, wine was lost — profit was lost — party was not to be, and nerves were tense.

The family gathered together and took some wet clay; they molded a pot and let it dry near the fire. The next harvest season came. The family made many pots and filled them with fresh wine. Child once again was to take the pots from the vineyard to the cave for cool storage. Yet Child was too weak to carry the pots and the pots were dropped, they broke. Wine was lost — profit was lost — party was not to be, and nerves were tense.

The family gathered together and took some wet oak wood; they dried the wood next to the fire and noticed the wood warped. The neighbor came over and assisted family with their metallurgy ability and formed an oak barrel. The next season came. The harvest was successful, wine was made the barrel was filled and child rolled the barrel into the cellar. Wine was consumed, profit was plenty, party was to be and nerves were calm.

One day Bruce Rector appeared. As he was to make many, many wines for the world to enjoy, he demanded wine vessels which impart oak flavor, profit, party to be had, and nerves of calm. "Ah, yes!" replied the trusty round table of winemakers, "we can use barrels, we can fill and empty them with hordes of employees, we can party, and achieve nerves of calm."

Bruce replied, "Ah, yes! But you cannot achieve profits aplenty." "What?" (replied the round table) "no profits aplenty?" "But, my trusty knights, we must make profits aplenty. We must make a 6000-gallon stainless steel tank perform like a 60-gallon barrel." And thus the search for barrel alternatives was born, and their use was a mystery.

Use of oak chips and staves as a barrel alternatives —10 years of trial and terror: At first, the chips we used were large like splintered pencils. As we used these chips, we discovered they did not come out of the tank so easily. We removed the lower valve to allow free flow of chips. This did not work. We then exchanged the lower tank valve from the standard butterfly to the standard gate valve. Chips were still getting stuck in the three-inch opening. So we modified the chip size for ease of use in the winery.

Again, we discovered they did not come out of the tank so easily. We attempted to shovel the chips out of the tank into bins. This was not so difficult to do except in the presence of lees. We also really did not want to have cellar personnel in the wine tanks.

We then used small red fermentation tanks with basket screens in them to strain juice from the chips. This worked pretty well **except** during red fermentation season. For white wine fermentation, the lees plugged the strainer.

Next we found special food-grade poly bags and filled them two thirds with chips. We put them in the tops of tanks after the juice or wine was in the tank; we also put them in the door of the tank before adding the juice or wine. The chips in the bags floated, some of the chips did not get wet and, although a tea bag does a great job in the teacup, we found the tea bag to be ineffective in achieving flavor and convenience of use. Then we tried to get the bags out of the tank. The bags swelled up so much that they barely fit through the door opening. So we went back to adding the chips directly to the tank. "Free the chips was heard throughout the cellars."

Separating the chips from the wine and or lees was another challenge, and we had considerable difficulty pumping the chips. We found draining wine from the chips slowly was important, we also used a basket screen to filter the chips that flowed out of the tank. We tried to pump the lees with chips in them to lees holding tanks. The chips got stuck in everything — pump bowls, valves, transfer line elbows, and hose fittings. We also found the oak chips to be 'unfilterable', as they plugged the filters instantly. We invented a chip auger to move the chips from the bottom of the tank to the 'sweko', which is a vibrating screen that separates the wine and lees from the chips.

The important things to keep in mind when using oak chips are worker safety, cellar efficiency, and effective exposure of the chips to wine.

Staves: Do not throw the staves in the tank freely! We tried that – we called the tank the shipwreck. It took weeks to get the staves out of the tank. Anchor them down well; most, if not all, of the stave manufactures sell stave support hardware. We had a rack of staves break free and float to the surface of the wine. When we

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pumped the wine out, the staves had to be cut up in place. Staves on racks are an imperative.

Oak alternatives and sulfide production: We have found the occurrence of hydrogen sulfide is increased in all oak types when associated with fermentation and sur lie aging. The occurrence of hydrogen sulfide appears to be endemic with fermentation on oak chips. The occurrence of hydrogen sulfide associated with oak chips appears to be minor with regard to the intensity and duration of the sulfidic compounds. Fermentation in association with staves and barrels appear to have higher than "standard" control type fermentations and less than that of oak chips. We, as an industry, should endeavor to conduct and support research work on hydrogen sulfide. It would be especially interesting to compare control fermentations with the different oak types. There may be a hidden compound or compounds in juice, which has oak extracts in it that hold the key to understanding hydrogen sulfide occurrence in wine fermentations.

Quality control of barrels, staves, and chips: There is no bona fide method of quality control for these oak materials that I am aware of. In the case of barrels, we water test for leakage and that is all. At this time, I use a visual inspection and sniff QC method. Basically, we look for consistency in wood and toast, and sniff for quality of toast, and sniff for off-aromas. In an industry of flavors and aromas, we need to put forth more effort to develop standards and techniques for oak material quality control.

Tasting of different oak types: The following is a chart of our findings regarding oak flavors in Chardonnay wine from different producers of American and French oak chips at different toast levels. We soaked oak chips from different producers in Chardonnay wine at the same usage rate for 14 days. We did not compare oak chips to barrels, as our objective here was to find the oak chip type that gave us the flavors we were looking for by preference. We set up a tasting with 16 winemakers. Results are given in the table below.

Deductions: Our tasting panel preferred oak flavors of vanilla-maple-spice-toast in combination, regardless of producer. American oak appears to produce the highest levels of vanilla flavors. The toast level appears to be responsible for the maple, spice, and toast components. Over-toasting produces a "charred" character, while under-toasting produces green/sawdust character (as a rule).

Tasting Results (16 winemakers)

	Oak type	Avg. quality rating	Taste comments
Producer (A)	American Heavy Toast	69.0	Vanilla (5), Maple (3), Spicey (3), Toast (3), High Intensity (2)
Producer (B)	American Toast, One Week	66.5	Big Vanilla (6), Maple (3), Spicey' (3), Toast (3), Sawdust (2)
Producer (B)	American Toast, Two Weeks	66.1	Vanilla (8), Cinnamon/Spicey (3), Toast (3), Maple (2), Citrus (2)
Producer (C)	American Heavy Toast	59.8	Vanilla (5), Maple (3), Toast (3), Smokey/Charred (2), Spicey (2)
Producer (C)	French Heavy Toast	58.4	Maple (4), Spicey (3), Toast (3), Raw Wood (6)
Producer (A)	American Medium Toast	57.5	Vanilla (7), Spicey (3)
Producer (A)	French Medium Toast	56.9	Bourbon/Vanilla (5), Sawdust/'Woodshop (4), Spicey' (2), Toast (2)
Producer (A)	French Heavy Toast	49.0	Vanilla (3), Smokey/Burnt (2), Floral/Perfume (2), Rubbery (2)
Producer (C)	American Medium Toast	45.3	Green/Sawdust/Raw Wood (5), Bourbon/Vanilla (3) Spicey (2), Citrus (2)
Producer (D)	French	44.6	Big Vanilla (4), Low Intensity (3), Toast (2), Citrus (2), Plastic Character (2)
Producer (D)	American Light Toast	41.3	Low Intensity (4), Smokey/ Burnt (3), Vanilla (2)
Producer (C)	French Medium Toast	39.7	Green/Sawdust/Raw Wood/'Woodshop (8), Dusty (3), Spicey (2)
Producer (C)	American Light Toast	30.2	Green/Sawdust/Raw Wood (5), Citrus (3), Spicey (2), Vanilla (2), Pine (2)
Producer (C)	French Light Toast	25.2	Low Intensity (4), Green Wood (3), Bourbon/Vanilla (2), Citrus (2)