



Testing the effect of different storage containers on flavor in Cabernet Franc

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Summary

Modern winemaking includes many choices of vessel shape and material for fermentation and storage. Different materials are thought to preserve or convey different sensory attributes to the wine. In this experiment, the same wine was stored in neutral oak barrels and a concrete tank for 6 months to determine if the differences in vessel material had an impact on sensory properties of the wines. The wines were perceived as different in a triangle test with the wine stored in neutral oak barrels scoring significantly higher for the descriptor “freshness”.

Introduction

Reaching as far back as ancient Greece³, the use of concrete tanks has a long history in Europe⁴ and has increased in the last decade to include much of the world.³ Most wineries still use stainless steel and oak barrels but many have incorporated a few concrete tanks into the arsenal of winemaking tools.¹ These tanks are used for both fermentation and aging^{2,3} and come in a variety of shapes and sizes.¹

The popularity of concrete is thought to be a response to the consumer trends toward less oak.³ Stainless steel, the other common alternative to oak, became popular in the 1950's and 1960's due to its production of wines that have a cleaner, fresher style with more perceived acidity.³ However, some feel wines fermented or aged in stainless steel are sharp, linear and too sterile.³ Concrete provides a middle ground. Made with thick heavy walls that are most often left unsealed allows for micro-oxygenation without oak flavors.¹ (Though it is possible to purchase these tanks sealed with epoxy, manufacturers say most are sold unlined.³) Thick walls also act as a heat sink, stabilizing temperature changes during fermentation.² These add together to produce wines that have softer texture² and are described as “bright and fruit forward with excellent texture and minerality”.³ The rich mouthfeel without oak flavors is thought by some to give a “better expression of the vineyard itself”.⁴

There are production considerations to using concrete tanks. They are massive, which means they are difficult to install and should not move once placed.⁴ They have been described as requiring “fussy cleaning”: scrubbers, metal, hot water, ozone, chlorine, and strong acids all cause damage.⁴ Common recommendations for cleaning includes washing with sodium percarbonate, then sanitizing with a rinse of aqueous ozone.¹ It is not recommended to use steam or water that is hot enough to sanitize (180) because heat can cause cracking, especially if there are glycol coils in the tank wall.¹ One source points out that despite the up-front cost, the durability of concrete tanks means in the long term they are much more affordable than barrels.²

This experiment is a comparison of wine stored in a concrete tank with the same Cabernet Franc wine stored in 2016 (third use) French oak barrel for 5-6 months.

Methods

Grapes were harvested on September 11 and chilled overnight prior to processing. The following day, grapes were destemmed with addition of 30 ppm SO₂ and 60 ml/ton Color Pro. Half of the fruit underwent pre-fermentation thermovinification while the other half did not. After heat treatment, all other cellar operations were the same for all vessels. Bins were inoculated with 20 g/hL GRE yeast rehydrated in 30 g/hL Go Ferm. Bins were pumped over for the first 2/3 of fermentation, then punched down twice daily after that. Chaptalization of 33 g/L was done at the peak of fermentation (when density was near 1030). There were no acid or nutrient additions. Fermentations were monitored daily for Brix and temperature and pressed after the completion of primary fermentation on September 17. Wine was allowed to settle in tank for 4 days prior to transfer to combination of thermovinified and conventional wines to produce a blend. The blend was then transferred to aging vessels for malolactic fermentation. After all malic acid was consumed, 50 ppm SO₂ was added without racking.

There were two different aging vessels:

1. 2016 (neutral) French oak Barrel
2. Concrete tank

Sensory analysis was completed in May by a panel of 21 wine producers. Wines were presented blind in randomly numbered glasses. Tasters were presented with three wines, two of one type and one of another, and asked to identify which wine was different (a triangle test). There were three tasting groups with the unique wine in the triangle test balanced between groups. Tasters were then asked to score each wine on a scale of 0 to 10 for freshness, body, fruit intensity and texture. They were also given open ended questions to describe the wines. Results for the triangle test were analyzed using a one-tailed Z test. Descriptive scores were analyzed using repeated measures ANOVA.

Results

General wine chemistry before and after aging can be found in Table 1. There was slightly higher accumulation of volatile acidity in the concrete tank when compared to the barrel. The hue of the wine overall was higher in the barrel than the tank, indicating a higher level of oxygenation in the barrel.

Table 1: Chemistry before and after aging in different type vessels (ICV Labs)

		VA (g/L)	pH	TA	Intensity	Hue
Barrel	11/26	0.41	3.84	4.16	2.7	1
	4/24	0.5	3.82	4.07	3.33	1
Concrete	11/26	0.41	3.91	3.83	2.8	0.89
	4/24	0.61	3.89	3.84	3.21	0.96

In a triangle test of concrete aged and barrel aged wines, 11 out of 21 respondents were able to distinguish which wine was different, indicating the wines were significantly different

($Z=1.62$, $p= 0.05$). The barrel aged wine scored significantly higher for freshness. There were no significant differences in scores for body, fruit intensity or texture between the wines (Table 2).

Table 2: Comparison of scores for specific descriptors in differently aged Cabernet Franc

Freshness	Mean	Standard Deviation	F	P
Barrel	6.10	1.81	7.0843	0.0159*
Coccio	4.70	1.49		
Body				
Barrel	5.39	1.22	0.0100	0.9216
Coccio	5.44	1.81		
Fruit Intensity				
Barrel	4.85	1.76	0.05	0.82
Coccio	4.70	1.64		
Texture				
Barrel	4.60	1.65	0.7377	0.4017
Coccio	5.10	2.08		

Conclusions

The use of concrete tanks for fermentation and storage of wine is thought to convey less flavor to the wine and retain greater freshness. However, in this case, the wine stored in neutral oak barrels was given significantly higher scores for freshness than wine stored in concrete tanks. In this experiment, wine was fermented in TBins and tanks and later transferred to barrels and concrete for aging. Also, aging was only for a short duration, 6 months. Additional differences in sensory properties may have become apparent if wine was fermented in concrete or stored longer in these vessels.

References

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- (4) Zitarelli, P. (2013). So long, stainless steel. Concrete barrels are the new trend in wine. Seattle Magazine, Nov 2013