The Impact of Saignee on Wine Quality (2017)

King Family Vineyards
Submitted by Matthieu Finot

Summary

This study examines the impact of saignee on Merlot wine quality. Merlot grapes were harvested from the same block on the same day and was split into 4 T Bins. The T Bins received the following treatments: 1) 0% Saignee, 2) 7% Saignee, 3) 15% Saignee, and 4) 25% Saignee. All other treatments between wines were identical. Brix and pH slightly increased by saignee, and TA slightly decreased in the must. Wine chemistry was not much affected by saignee. Color intensity increased with increasing saignee. Anthocyanin and tannin were also increased by saignee. These increases were generally correlated to increasing levels of saignee. Overall, the higher rates of saignee may have slightly increased Fruit Intensity, Herbaceous/Green character, Bitterness, and Astringency. The higher rates of saignee tended to be more preferred (although preferences changed between tastings). Saignee may prove to be a valuable tool in Virginia red winemaking and should be examined at many different sites among many different varieties.

Introduction

Saignee is French for “bleed,” and is the process whereby a portion of free-run juice is removed from crushed red grapes in an attempt to increase the solids to juice ratio. This alteration of the skin to juice ratio is meant to simulate smaller berry size, which is often thought to be a marker for high quality berries (Singleton 1972). Anecdotally, saignee is thought to concentrate flavor and phenols, or to counter water additions meant to lower alcohol content. This is because anthocyanins and, to a lesser extent, phenols and other phenolic compounds begin to be extracted from crushed grapes in 30 minutes to one hour. As a result, juice that is removed prior to this time is very low in concentration of these compounds, allowing for potential further concentration of these compounds later through a higher skin to juice ratio. Saignee can concentrate all flavors, including green flavors and other off flavors (Ritchie; Gardner 2015). Saignee may lower the YAN of the juice and may as well lower the TA of the must. Generally, only 5-10% saignee is performed on good quality, non-watered down grapes, and up to 30% may be necessary for berries with much more water dilution (due to rain events, perhaps) (Ritchie).

Many studies have found that saignee increases anthocyanins and tannin in finished wine (Singleton 1972; Gerbaux 1993; Zamora et al. 1994; Gawel et al. 2001; Sacchi et al. 2005; Fanzone et al. 2013; Casassa et al. 2016; Wu et al. 2017). Saignee wines may result in more and larger polymeric pigment and tannin, as well as slightly higher color and phenolics (Gerbaux 1993; Sacchi et al. 2005). This would suggest higher color stability. However, some studies suggest that the long-term stability of the anthocyanins and phenolics may be negligible compared to no saignee, as after 6 months the levels seem to approach each other (Gawel et al. 2001; Harbertson et al. 2009). Saignee, therefore, may just be a young wine effect (Sacchi et al. 2005). Saignee may also favor an increased extraction of seed tannin relative to control wines (Harbertson et al. 2009), but this is not always the case (Casassa et al. 2016). Saignee may also be used to counteract the phenolic and aromatic dilution effect of adding water to high Brix musts (Harbertson et al. 2009). In some cases, only high amounts of saignee (up to 30%) can have a significant effect on anthocyanin concentration (Fanzone et al. 2013). Although the phenolic attributes of wines are often changed by saignee, judges cannot always tell the difference (Fanzone et al. 2013).

Other wine parameters can be increased by saignee as well, such as potassium, pH, aromatic intensity, color, astringency, and overall wine quality (Figure 1) (Singleton 1972). However, this is not always the case, as one study found that a 14% saignee may not result in general chemistry differences except for a slightly lower TA (which disappeared after a year) (Wu et al. 2017). The increase in pH and decrease in TA is likely due to increased potassium concentration resulting from a higher solids:juice ratio. This may also explain why other chemistry parameters are not as much affected, as other parameters such as Brix are not impacted as much by skin contact but instead come out solely with the juice.

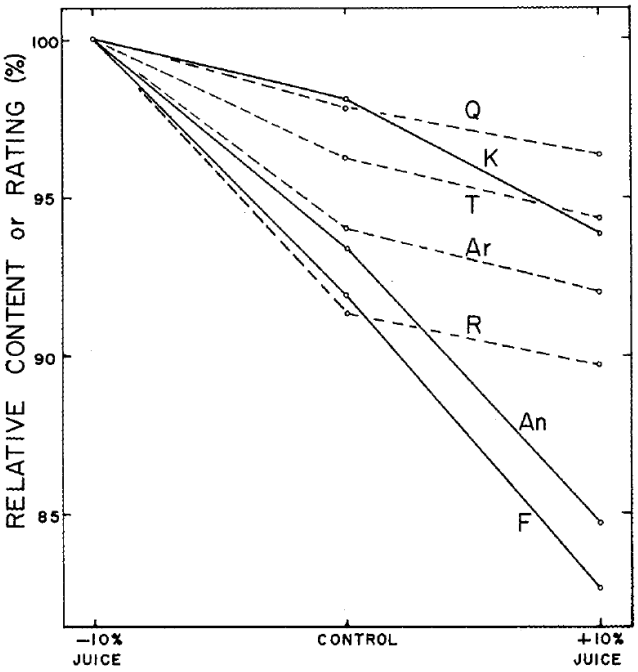


Figure 1. Relative mean contents (solid lines) of potassium (K), anthocyanin color (An), flavonoid (F), and sensory ratings (dashed lines) of quality (Q), tannin (T), aroma (Ar), and red color (R) for sets of wines prepared from 9 grape varieties by removal or addition of 10% juice prior to fermentation to simulate berry size differences.

Adapted from Singleton 1972

The purpose of this study is to investigate how differing levels of saignee impact Merlot wine chemistry and quality.

Results and Discussion

Brix and pH slightly increased by saignee, and TA slightly decreased in the must. Wine chemistry was not much affected by saignee. Color intensity increased with increasing saignee. Anthocyanin and tannin were also increased by saignee. These increases were generally correlated to increasing levels of saignee.

Juice Chemistry			
	Brix	pH	TA (g/L)
0% Saignee	23.0	3.58	3.9
7% Saignee	23.1	3.53	4.0
15% Saignee	23.7	3.60	3.6
25% Saignee	23.6	3.69	3.6

Wine Chemistry											
	Ethanol (%vol/vol)	Residual Sugar (g/L)	pH	TA (g/L)	Volatile Acidity (g/L)	Malic Acid (g/L)	Lactic Acid (g/L)	IBMP (ng/L)	Total SO2 (ppm)	Free SO2 (ppm)	Molecular SO2 (ppm)
0% Saignee	13.11	<1	3.64	4.76	0.64	<0.15	0.62	<1.0	53	34	0.73
7% Saignee	13.22	<1	3.56	5.17	0.62	<0.15	0.53	<1.0	52	34	0.87
15% Saignee	13.52	<1	3.68	4.87	0.72	<0.15	0.62	<1.0	51	30	0.60
25% Saignee	13.31	<1	3.75	4.68	0.67	<0.15	0.58	<1.0	49	30	0.51
% Change 7%	1%		-2%	9%	-3%		-15%		-2%	0%	19%
% Change 15%	3%		1%	2%	13%		0%		-4%	-12%	-18%
% Change 25%	2%		3%	-2%	5%		-6%		-8%	-12%	-30%

Results from ICV in Mid February 2018, Except for IBMP which is from ETS

Color Profile					
	A420	A520	A620	Hue (420/520)	Intensity (420 + 520 + 620)
0% Saignee	0.321	0.460	0.109	0.698	0.890
7% Saignee	0.361	0.545	0.120	0.662	1.026
15% Saignee	0.388	0.563	0.136	0.689	1.087
25% Saignee	0.414	0.591	0.149	0.701	1.154
% Change 7%	12%	18%	10%	-5%	15%
% Change 15%	21%	22%	25%	-1%	22%
% Change 25%	29%	28%	37%	0%	30%

Results from ICV in Mid February 2018

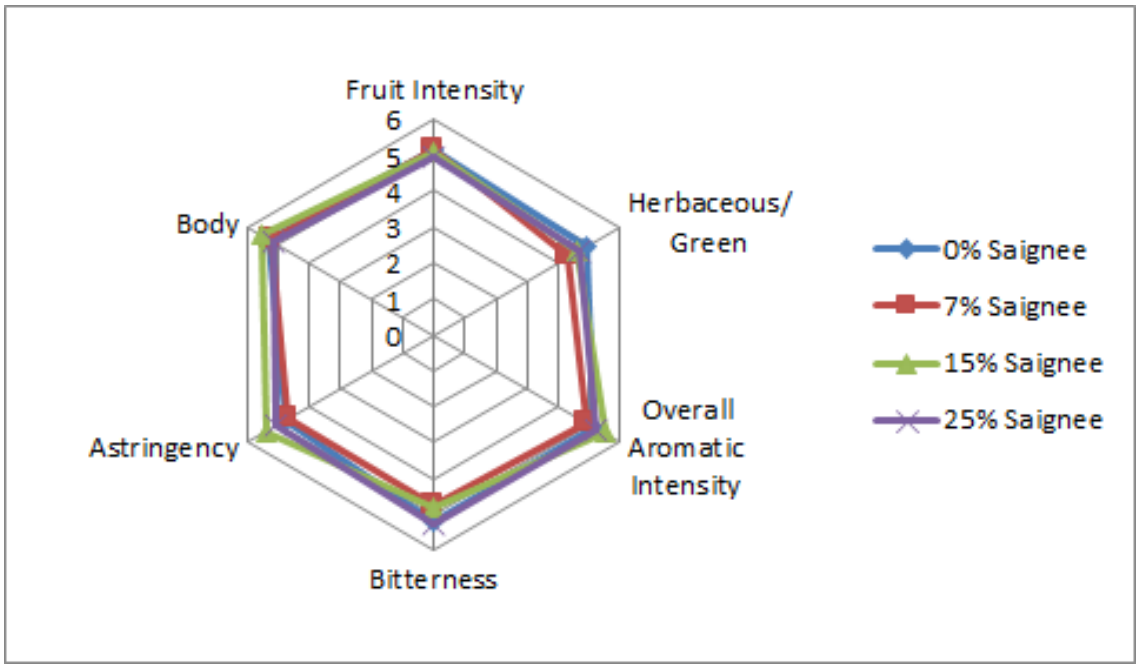
Phenolic Profile							
	Caffeic Acid (mg/L)	Caftaric Acid (mg/L)	Catechin (mg/L)	Epicatechin (mg/L)	Catechin: Epicatechin Ratio	Catechin: Tannin Ratio	Gallic Acid (mg/L)
0% Saignee	5	17	20	16	1.25	0.04	20
7% Saignee	5	16	19	12	1.58	0.04	19
15% Saignee	4	17	23	16	1.44	0.04	20
25% Saignee	4	16	25	18	1.39	0.04	23
% Change 7%	0%	-6%	-5%	-25%	26%	0%	-5%
% Change 15%	-20%	0%	15%	0%	15%	0%	0%
% Change 25%	-20%	-6%	25%	13%	11%	0%	15%

Results from ETS in Mid February 2018

Phenolic Profile								
	Malvidin glucoside (mg/L)	Monomeric Anthocyanins (mg/L)	Polymeric Anthocyanins (mg/L)	Quercetin (mg/L)	Quercetin Glycosides (mg/L)	Tannin (mg/L)	Total Anthocyanins (mg/L)	Resveratrol (cis and trans) (mg/L)
0% Saignee	234	377	35	1	13	481	412	3.0
7% Saignee	242	400	38	1	15	530	438	3.0
15% Saignee	246	404	43	1	18	574	447	2.5
25% Saignee	251	412	46	1	22	643	458	2.3
% Change 7%	3%	6%	9%	0%	15%	10%	6%	0%
% Change 15%	5%	7%	23%	0%	38%	19%	8%	-17%
% Change 25%	7%	9%	31%	0%	69%	34%	11%	-23%

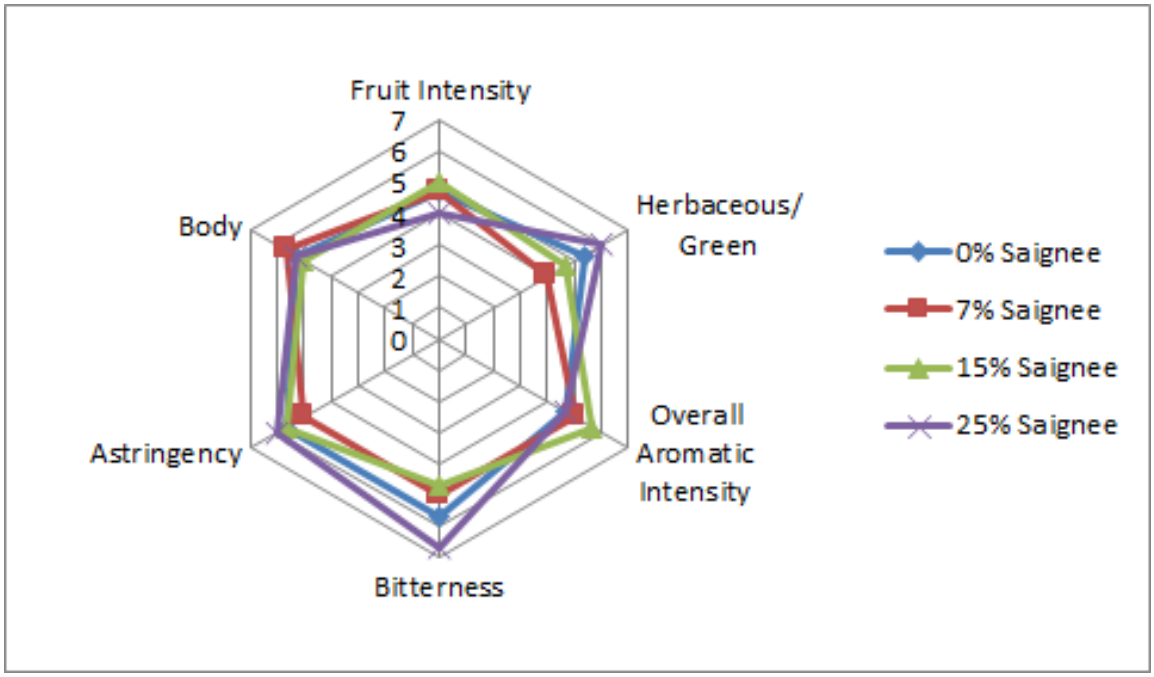
Results from ETS in Mid February 2018

For the descriptive analysis on February 28, there were no strong trends for the descriptors used in this study. The 15% and 25% saignee may have had slightly higher Astringency. There was a slight preference for the 25% Saignee wine, followed by either the 7% or the 0% Saignee.

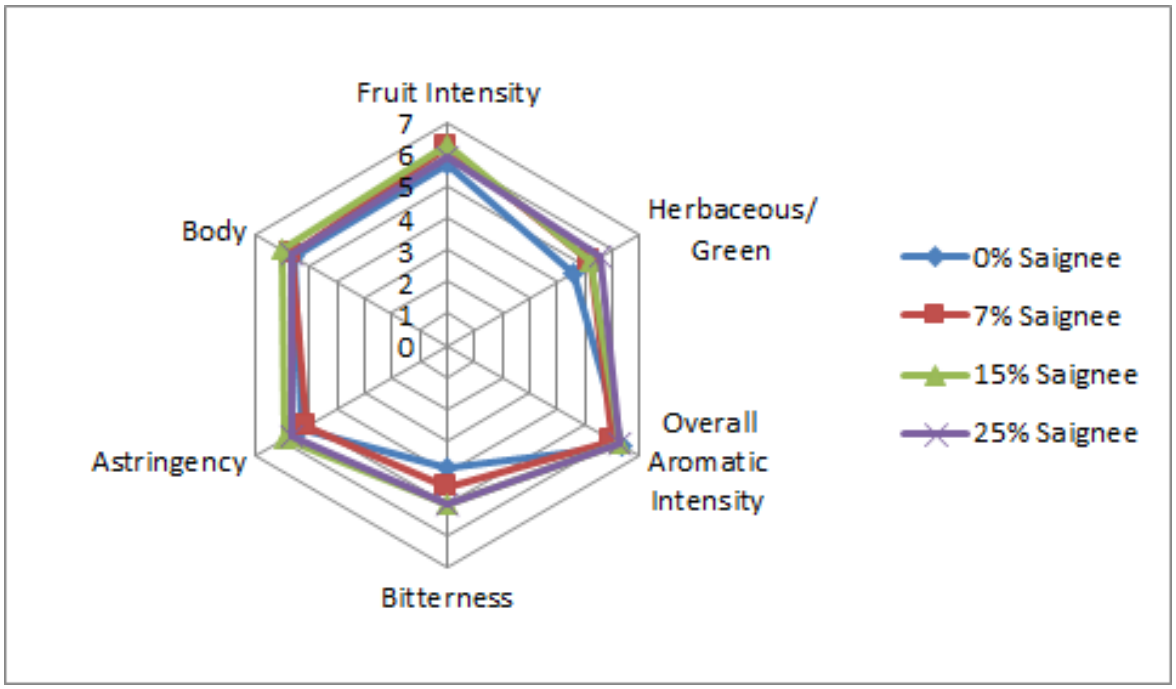


	0% Saignee	7% Saignee	15% Saignee	25% Saignee	Total Votes
Most Preferred	25%	21%	18%	36%	28
Second Most Preferred	25%	29%	17%	29%	24
Third Most Preferred	26%	35%	26%	13%	23
Least Preferred	25%	17%	33%	25%	24

For the March 14 tasting, there was a slight tendency for 25% saignee to have more Bitterness, Astringency, and Herbaceous/Green character. The 7% saignee seemed to be least in these regards and was perhaps slightly preferred. However, there were not many judges at this tasting and so these results are weak.



For the descriptive analysis on April 4, there were no strong trends for the descriptors used in this study. There was a slight tendency for the higher rates of saignee to have higher Fruit Intensity, Herbaceous/Green character, Bitterness, and Astringency. In general, the 15% saginee seemed to be the most preferred, and the 7% and 0% were second most preferred.



	0% Saignee	7% Saignee	15% Saignee	25% Saignee	Total Votes
Most Preferred	22%	33%	44%	0%	9
Second Most Preferred	43%	14%	14%	29%	7
Third Most Preferred	14%	14%	29%	43%	7
Least Preferred	22%	33%	11%	33%	9

Overall, the higher rates of saignee may have slightly increased Fruit Intensity, Herbaceous/Green character, Bitterness, and Astringency. The higher rates of saignee tended to be more preferred (although preferences changed between tastings). Saignee may prove to be a valuable tool in Virginia red winemaking and should be examined at many different sites among many different varieties.

Methods

Merlot grapes from the same block were harvested and processed on September 25, 2017. The Merlot grapes were split into 4 different T Bins, each receiving the following treatment:

1. 0% Saignee
2. 7% Saignee
3. 15% Saignee
4. 25% Saignee

Saignee was performed just after crush. All other treatments were the same. 15ppm sulfur dioxide was added to the musts, and then they were inoculated with 0.15g/L D80 yeast. Each bin was punched down twice per day.

The wine was pressed on October 10 into separate tanks, allowed to settle, and then racked to barrel the following day. Malolactic conversion commenced on November 2. On November 23, each wine received 0.03g/L Stab Micro and 66ppm sulfur dioxide.

These projects were tasted on February 28, March 14, and April 4, 2018. In order to balance the data set to perform statistical analysis for descriptive analysis on the February 28 tasting, any judge who had not fully completed the descriptive analysis ratings were removed. In order to then make the number of judges between groups equivalent, one judge from group 2 was transferred to group 1, and another judge from group 2 was eliminated. This resulted in a final data set of 3 groups, each with 8 judges (considered as replications within groups, and groups were considered as assessors). Data was analyzed using Panel Check V1.4.2. Because this is not a truly statistical set-up, any results which are found to be statistically significant ($p<0.05$) will be denoted as a "strong trend" or a "strong tendency," as opposed to general trends or tendencies. The statistical significance here will ignore any other significant effects or interactions which may confound the results (such as a statistically significant interaction of Judge x Wine confounding a significant result from Wine alone). The descriptors used in this study were Fruit Intensity, Herbaceous/Green, Overall Aromatic Intensity, Bitterness, Astringency, and Body.

Due to the very small number of judges (3) at the March 14 tasting, only slight trends will be discussed for the sensory information.

The same procedures for data analysis were used on the April 4 tasting. For the descriptive analysis in this tasting, one judge was eliminated from group two so that each group had 3 judges, for a total of 9 judges.

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