The Vasse Felix approach to the use of micro-oxygenation

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Vasse Felix, Margaret River, WA

Introduction

The technique of micro-oxygenation is a new one. At Vasse Felix our experience with it is only three vintages old. Vasse Felix is primarily interested in using micro-oxygenation to enhance the quality of its wines. With each vintage, the learning curve has been steep, and it is challenging to learn how to apply micro-oxygenation to individual vintage conditions.

For example, understanding the effect of micro-oxygenation in changing wine conditions, such as: sugar ripeness, physiological (flavour) ripeness, increasing tannin profiles and overall wine balance. We find ourselves asking, 'How can micro-oxygenation enhance the quality of our wines?'

Initially we were interested in using micro-oxygenation to improve wines made from young vines and wines made from physiologically unripe fruit from a difficult year (eg. Mount Barker 2000). However, as our experience has grown we see benefit from using certain micro-oxygenation techniques on our premium wine styles, particularly when trying to build structure for long term aging.

During the first two years we were very cautious and took the approach of only using low rates after fermentation (2-7mL/L/month) under the protection of SO2 rates such as 30ppm free.

Before proceeding with increased oxygenation rates, our concerns were answers to questions such as:

1. How much oxygen could be added before going too far and oxidising the wine?
2. Would the wines have long term aging potential?
3. Are we encouraging microbiological spoilage?
4. Is oak required in combination to effectively micro-oxygenate?
5. How big a tank size can be oxygenated effectively using one ceramic sinter?

The experiments conducted will not bear close scientific scrutiny. Due to the complexities of managing a winery during vintage, many of the 'control' wines were blended at a later date, and many of the results we saw came from tasting and sensory results that can give conflicting results depending on each person's palate perceptions. Positive results have come out of our experience using micro-oxygenation, especially with red wines from Mount Barker in 2000/2001 that showed herbaceous, green, dimethyl-sulfide (DMS) and green tannin structure. After micro-oxygenation these wines improved considerably, especially in the palate, bringing more fruit to the fore and more rounded flavours to the palate.

By the third vintage (2002) (feeling somewhat braver) Vasse Felix engaged the advice of WineNet Consultancy. Consequently, a decision was taken to increase structure and build the tannin and colour of our wines by adding oxygen at higher rates between primary fermentation and malolactic fermentation. The theory proposed that with no free SO2 to bind the aldehydes, the cross-linking of tannins and anthocyanins is able to occur more readily and create more stable pigments enhancing body and colour. These were the most exciting results we had seen, encouraging us to take greater steps during the next vintage.

The other tool of oxygenation we are trialling is the 'cliquer', which we refer to as 'macro-oxygenation'.

Here we are injecting high rates of oxygen to tanks and barrels. The technique can be used to 'kick-start' sluggish fermentations during vintage, or more often, post primary fermentation, to soften harsh tannins and round out the wines hopefully fleshing them out. Further, we note reduced problems with sulfides and reductive notes, and this type of oxygenation may take the place of one or two barrel rackings.

The following case studies are a selection of a few experiences from the past three vintages, and trace our progression along the micro-oxygenation learning curve.

Case Study 1: Vintage 2000

The wine: OHEBCS01 — Young vineyard Cabernet Sauvignon from Heytesbury Vineyard (Carbunup, sub-region of Margaret River).

Trial: Micro-oxygenation (with oak) vs. barrel fermentation vs. tank control (no oxygen/no oak)

Objectives: To test the use of micro-oxygenation (post-fermentation) on a young block of Cabernet Sauvignon, observing its effect in comparison to our normal barrel fermentation and tank fermented wines.

OHEBCS01 picked 20/03/2000

Harvest data: Be° 13.6

pH 3.71

T.A. 6.5g/L

Fruit Tasting Note: Ripe mulberry jam, reasonable colour in skins, moderate berry size, clean fruit, little or no MOG (material other than grapes).

Additions: 70ppm SO2 at harvest

100ppm white fluffy tannin (tannic acid)

200ppm DAP

200ppm Lallemand ‘M I’ Yeast (350)

1.5 g/L Tartaric Acid

Rotation Fermented at 20–25°C

Pressed at 2.5 Be° (after 5 days fermenting in the Rotary)
Table 1. Results: OHETCS01

<table>
<thead>
<tr>
<th>27/6/00</th>
<th>Barrel Fermented (2 rackings)</th>
<th>Micro-oxygenation (1 racking)</th>
<th>Tank Control (2 rackings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>84 Days Micro - Ox</td>
<td>2.9</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Dissolved O₂ (ppm)</td>
<td>9</td>
<td>8.8</td>
<td>7.9</td>
</tr>
<tr>
<td>Colour Density (a.u.) ( (A_{520} + A_{440}) )</td>
<td>1.59</td>
<td>1.69</td>
<td>1.63</td>
</tr>
<tr>
<td>Colour Hue ( (A_{420}/A_{440}) )</td>
<td>508</td>
<td>428</td>
<td>389</td>
</tr>
<tr>
<td>Total Anthocyanin (mg/L)</td>
<td>76.2</td>
<td>62.4</td>
<td>58.35</td>
</tr>
<tr>
<td>Total Coloured Anthocyanin (mg/L)</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Degree of Anthocyanin ionisation ( (\alpha) \times 100 )</td>
<td>45</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>Total Phenolics (a.u.) ( (A_{280} + A_{230} - 4) )</td>
<td>0.28</td>
<td>0.33</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Note: The above measurements were determined by spectral evaluation (Somers and Evans 1977).

- Chemical age is an index of polymeric pigment forms displacing anthocyanins i.e. as the ratio approaches 1, the more apparent aging reactions taking place.
- Total anthocyanins are the coloured and colourless forms i.e. \( A_{520} \) at pH < 1 (coloured flavylium form) and \( A_{520} \) (colourless form).
- Degree of anthocyanin ionisation refers to the percentage of total anthocyanins in the coloured form.
- Total coloured anthocyanins = \( \alpha \) / 100 × total anthocyanins.

Split into 3 batches:
1. Barrel Fermented (10 barrels, 100ppm quertanin added)
2. Tank Fermented with Micro-oxygenation. Tank 36 with Stavin oak and micro-oxygenation at 1-5 mL/L/month (5 days at 5 mL/L/month and 79 days at 1 mL/L/month).
3. Control Tank Fermented. No oak/no micro-oxygenation.

Tasting notes:
Barrel Fermented: Bright, full colour, smoky oak, minty, earthy fruit, some toughness on palate, green tannins, strong fruit (A–).
Barrel (but not barrel fermented): Put to barrel 23/5/00 from control tank: Medium red, some development, sweet fruit, rich, some reduced notes, slightly leafy (A–).
Micro Wine: Bright colour, cherry/cordial fruit, some oak showing, medium body, soft full palate (A–).
Control (tank): Bright colour, reduced, vegetable nose, some cherrry fruit, up-front tannin, still raw, slight reduction (B+).

Overall Summary: The Cabernet Sauvignon does seem to have an enriched palate structure, arising from the micro-oxygenation treatment. The treated wine more often showed sweet fruit flavours and increased depth of colour. The analytical data appears to support this but requires further examination.

Case Study 2: 2000 Vintage (Mount Barker Shiraz 2000)
The wine: O F H T SH 11 We t, cool vintage in M ount Barker, poor ripeness, poor canopy exposure. D M S character, high M O G - weeds and lupins, sulfidic, reduced notes.

O F H T SH 11: picked 4/4/00
Harvest data: Be° 11.5
pH 3.52
TA 6.9 g/L
Additions: 70ppm SO₂ in bins
100ppm White fluffy (tannic acid)
100ppm VR supra yeast
200ppm DAP
200ppm '254' Yeast
Rotary Fermented: Temperature 18°C–25°C very reductive characters arising during ferment requiring higher rates of DAP, 200ppm/time added 3 times.
20/5/00 Malolactic fermentation (MLF) complete, 50ppm SO₂ added, pH = 3.42 Racked twice with air.

Split into 2 tanks:
1. Micro-oxygenation: 77 days at 3 mL/L/month and 10 days at 1 mL/L/month
2. Control (no micro-oxygenation)

Tasting notes: Robert Paul (22 June 2000)
T 56 Micro - oxygenated Forest Hill Shiraz (3 mL/L/month): Bright medium colour, some smelly sulfide, tarry herbal edge, cooked fruit, spicy furry tannins. (B+)
T 57 Control Forest Hill Shiraz (racked once with air): Medium colour, slightly dull, sulfide, coal gas aromas, dirty sulfide, green menthol on palate. (B)

Tasting notes: Robert Paul (27 July 2000)
T 56 Micro oxygenated Forest Hill Shiraz: Medium colour, rubbery, green aromas, berry fruit underneath. (B)
T 57 Control Forest Hill Shiraz: Very smelly, dirty nose, green fruit, tarry flavours. (C).

Case Study 3: Vintage 2001
Changes in Chemical and Sensory Properties of Micro oxygenated Wines Over Time.
The Wine: IHEASH01: Young block Shiraz from Heytesbury vineyard at Carbunup, sub-region of Margaret River.
Vintage 2001: Warmer than usual during ripening, 2 weeks earlier, high sugar levels however lack of tannin ripeness and maturity.
Objectives:
a) To try and enrich palate and structure, improve colour and round out harder edged tannins, reduce astringency and rawness. b) To monitor effects of micro-oxygenation over time.

IHEASH01: picked 12/3/01
Harvest data: Be° 14.05
pH 3.73
TA 5.5 g/L
Additions: 70ppm SO₂ in bins
2 g/L tartaric acid
100ppm tannic acid (white fluffy)
No DAP (only when required)
200ppm Lallemand "MI" Yeast (350)
Rotary fermented: 20°–25°C: 4 days then pressed off at 4.0 Be° pH 3.50. Completed MLF 24/5/01 pH 3.76 1.5g/L tartaric added pH now: 3.55
70ppm SO₂ added
Micro-oxygenation on Stavin oak segments. Tank size 90,000L

<table>
<thead>
<tr>
<th>Date</th>
<th>Rate mL/L/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/06/2001</td>
<td>2</td>
</tr>
<tr>
<td>23/06/2001</td>
<td>2</td>
</tr>
<tr>
<td>12/07/2001</td>
<td>0.5</td>
</tr>
<tr>
<td>16/07/2001</td>
<td>2</td>
</tr>
<tr>
<td>19/09/2001</td>
<td>2</td>
</tr>
<tr>
<td>25/01/2002</td>
<td>1</td>
</tr>
<tr>
<td>12/02/2002</td>
<td>Micro stopped</td>
</tr>
</tbody>
</table>

Tasting notes: Robert Paul (5 March 2002)

Some development of colour, butterscotch/caramel aromas, fruit lift on palate, some leesy notes and sign of drying tannins.

At this point I questioned whether we may have gone too far with oxygenation rates, or is 90,000L tank too big for one sinter? i.e.: the amount of oxygen delivered around one sinter to oxygenate 90,000L is oxidising the wine immediately around the sinter.

Table 2. Colour Analysis

<table>
<thead>
<tr>
<th>Data</th>
<th>Colour Density (a.u.) (A520 + A420)</th>
<th>Colour Hue (A420 / A520)</th>
<th>Total Anthocyanin (mg/L)</th>
<th>Total Coloured Anthocyanin (mg/L)</th>
<th>Degree of Anthocyanin ionisation (α) (%)</th>
<th>(A520/A520 HCl) ×100</th>
<th>Total Phenolics (a.u.) (A280 HCl - 4)</th>
<th>Chemical Age Index (A520 SO2 / A520 CH3 CHO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/7/01</td>
<td>11.4</td>
<td>0.64</td>
<td>578</td>
<td>127.1</td>
<td>22</td>
<td>56</td>
<td>0.37</td>
<td>0.36</td>
</tr>
<tr>
<td>2/10/01</td>
<td>12.1</td>
<td>1.67</td>
<td>340</td>
<td>136</td>
<td>40</td>
<td>40</td>
<td>0.36</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Observations: Over time the total anthocyanin content decreased, but coloured anthocyanins increased illustrating that there are more polymeric pigments in the stable form which are less susceptible to pH and SO2 changes.

The colour hue increased significantly with a marginal increase in colour density. Overall there was an improvement in colour.

However, total phenolics decreased perhaps indicating we went too far, or the building blocks of tannin structure were not there to begin with for the amount of oxygen that was delivered. This may have caused the highly condensed tannins to precipitate.

It appears that the micro-oxygenation did not significantly increase browning effects on the wine.

Graph 1: Total Anthocyanin (mg/L) vs. Total Coloured Anthocyanin

Case Study 4: Vintage 2001

Changes in Chemical and Sensory Properties of Micro-oxygenated Wines Over Time.

The wine: IPLACS01 A young block of Cabernet Sauvignon from Forest Hill Vineyard, Mount Barker (WA).

Vintage 2001: A good year, very dry but cool, lowest ever levels of Botrytis, fruit was left hanging on the vine for a longer than usual time due to cool and mild weather conditions in March. The yields were down 10% in reds.

Objectives: a) To try and enrich palate and structure, improve colour and round out harder edged tannins, reduce astringency and rawness. b) To monitor effects of micro-oxygenation over time.

Harvest data: picked 27/3/01
Be° 12.7
pH 3.85
TA 3.65 g/L

Additions: 70ppm SO2 in bins
1.5g/L tartaric acid
100ppm tannic acid
No DAP (except when required during fermentation)

“71B” yeast at 200ppm
(this yeast is reportedly alcohol tolerant and ferments 30% malic to ethanol)

Rotary fermented: pressed after 5 days at 2.5 Be° at 18° to 25°C. Malolactic Completed 5/6/01 pH 3.58
70ppm SO2 added, no tartaric added.

Micro-oxygenation program (no oak staves in tank)

<table>
<thead>
<tr>
<th>Date</th>
<th>Rate mL/L/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/6/01</td>
<td>5</td>
</tr>
<tr>
<td>12/7/01</td>
<td>5</td>
</tr>
<tr>
<td>27/7/01</td>
<td>3</td>
</tr>
<tr>
<td>19/9/01</td>
<td>2</td>
</tr>
<tr>
<td>23/9/01</td>
<td>Turn-off</td>
</tr>
<tr>
<td>10/12/01</td>
<td>To barrel</td>
</tr>
</tbody>
</table>

Tasting notes: Robert Paul (5 March 2002)

Medium deep colour, spicy, leafy, cassis aromas, smoky oak, up-front tannins still reasonably hard, good mid palate with berry flavours and oak character working well together. Good wine with potential.

Table 3. Colour Analysis

<table>
<thead>
<tr>
<th>Data</th>
<th>Colour Density (a.u.) (A520 + A420)</th>
<th>Colour Hue (A420 / A520)</th>
<th>Total Anthocyanin (mg/L)</th>
<th>Total Coloured Anthocyanin (mg/L)</th>
<th>Degree of Anthocyanin ionisation (α) (%)</th>
<th>(A520/A520 HCl) ×100</th>
<th>Total Phenolics (a.u.) (A280 HCl - 4)</th>
<th>Chemical Age Index (A520 SO2 / A520 CH3 CHO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/7/01</td>
<td>12.6</td>
<td>0.6</td>
<td>676</td>
<td>175</td>
<td>26</td>
<td>52</td>
<td>0.28</td>
<td>0.31</td>
</tr>
<tr>
<td>2/10/01</td>
<td>12.4</td>
<td>1.62</td>
<td>374</td>
<td>157</td>
<td>42</td>
<td>33</td>
<td>0.31</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Observations: A gain the trend for the micro-oxygenated sample was for total anthocyanin to decrease, but with an increase in total coloured anthocyanin which is a more stable form. Also total phenolics fell, however colour density did not increase, but colour hue increased significantly.

This wine did not have any oak staves added to the tank (whereas IH EA SH 01 did).
We are uncertain as to the affect this had on the results? Subsequently this wine was placed in French oak barriques and was a small component of the 2001 Vasse Felix Cabernet Sauvignon. The finished wine was rich in the palate, open on the nose and well balanced. The chemical age index on the wine did not change dramatically indicating no big changes in the colour stability of the wine.

**Case Study 5: 2002 Vintage**

**Building structure of wines using ‘macro’ levels of oxygen between primary fermentation and MLF**

**The wines:** 2HEME04A (T26) VS 2HEME01A (T92)

Young block Merlot from Heytesbury vineyard at Carbunup, sub region of Margaret River.

**Vintage 2002:** Lower yields on average and picking times 2–3 weeks later than normal. Cooler than normal in January–March.

**Objectives:** This year we wanted to see the potential of pre-SO2 micro oxygenation at high rates of up to 60mL/L/month.

The time between end of primary ferment and the onset of MLF may be as short as a few days given MLF occurs sometimes spontaneously in our wines during primary fermentation. However, in previous years at Vasse Felix we have induced MLF at pressing when primary fermentation is still occurring.

This vintage we changed our practices to allow micro-oxygenation to be performed at higher rates prior to MLF (40-60mL/L/month) for a period of 5–7 days.

The aim of this practice was to enable ‘structuralisation’—i.e. condensation and cross-linking of aldehydes, tannins and anthocyanins to occur to form more stable colour and tannins, especially when anthocyanins are high in concentration and available for reaction. A gain we took the cautious approach of not adding too much oxygen—how much is too much?

**Table 4. Harvest data**

<table>
<thead>
<tr>
<th>2HEME01A</th>
<th>2HEME04A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be°</td>
<td>12.7</td>
</tr>
<tr>
<td>TA g/L</td>
<td>7.0</td>
</tr>
<tr>
<td>PH</td>
<td>3.46</td>
</tr>
<tr>
<td>Additions</td>
<td>70ppm SO2 in bin</td>
</tr>
<tr>
<td>No tartaric acid</td>
<td>1 gm/L tartaric acid</td>
</tr>
<tr>
<td>200ppm tannic acid</td>
<td>200ppm tannic acid</td>
</tr>
<tr>
<td>200ppm “MI” yeast</td>
<td>200ppm “MI” yeast</td>
</tr>
</tbody>
</table>

**Tasting Note Fruit:**

Rhubarb, ripe cherry, quite uplifted raspberry; not very intense

**Table 5. Micro-oxygenation program**

<table>
<thead>
<tr>
<th>2HEME01A</th>
<th>2HEME04A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fermentation temperature:</td>
<td>20°C–27°C</td>
</tr>
<tr>
<td>Air during fermentation:</td>
<td>100L/hour for 3 x 15 min sessions</td>
</tr>
<tr>
<td>Post pressing air:</td>
<td>45 mins cliquer @ 150 kpa</td>
</tr>
<tr>
<td>Micro-oxygenation rates:</td>
<td>No micro-oxygenation</td>
</tr>
<tr>
<td></td>
<td>19/3/2002 30mL/L/month</td>
</tr>
<tr>
<td></td>
<td>20/3/2002 30mL/L/month</td>
</tr>
<tr>
<td></td>
<td>22/3/2002 40mL/L/month</td>
</tr>
<tr>
<td></td>
<td>24/3/2002 60mL/L/month</td>
</tr>
</tbody>
</table>

**Tasting notes:** Robert Paul (3 September 2002)

2HEME01A: advanced colour, reds, open cherry aroma, fruit cooked chocolate, simple.

2HEME04A: fresh, stronger colour, firm, tannins are structured, toasty oak, built up, tougher wine structurally.

**Table 6. Colour Analysis**

<table>
<thead>
<tr>
<th>2HEME01A</th>
<th>2HEME04A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour Density (a.u.) (A520 + A420)</td>
<td>8.0</td>
</tr>
<tr>
<td>Colour Hue (A420 / A520)</td>
<td>1.38</td>
</tr>
<tr>
<td>Total Anthocyanin (mg/L)</td>
<td>359</td>
</tr>
<tr>
<td>Total Coloured Anthocyanin (mg/L)</td>
<td>16</td>
</tr>
<tr>
<td>Degree of Anthocyanin ionisation (α) (%)</td>
<td>(A520/A520 HCl × 100)</td>
</tr>
<tr>
<td>Total Phenolics (a.u.) (A280 HCL - 4)</td>
<td>44</td>
</tr>
<tr>
<td>Chemical Age Index (A520 SO2/ A520 CH3 CHO)</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**Observation:** From the results we can see considerable differences between the two wines. Whether these differences are purely due to the oak component being present in 2HEME04A or micro oxygenation is unclear.
The Vasse Felix Approach to the Use of Micro-oxygenation


The Wine: 2HESH11B, a young vineyard Shiraz from the Heytesbury Vineyard, Carbunup, sub region of Margaret River.

Harvest Data: picked 26/3/2002
- Be° 12.6
- TA 5.25 g/L
- pH 3.69

Fruit moderately cropped at 10 tonnes/hectare, showing ripe fruit cake flavours and moderate colour in the berries.

Additions: 700 ppm SO₂ in bins
1000 ppm White fluffy tannin
2.7 g/L tartaric acid
200 ppm DAP
200 ppm "M1" (350) yeast

Rotary fermented: 5 days at 20–25°C, pressed to tank number 90, Pressing Date 31/3/02
- 1/4/2002: 30 minutes cliquer at 80 kPa at 0.6 Be°
- 3/4/2002: Racked to Tank 87
- 15/5/2002: 10 minutes cliquer at 80 kPa
- 31/5/2002: Racked to barrel

2HESH11B (oxygen) 2HESH11B control

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20/6/2002</td>
<td>Cliquer 30 kPa for 1 min</td>
<td>Racked 14/6</td>
</tr>
<tr>
<td>22/7/2002</td>
<td>Cliquer 30 kPa for 1 min</td>
<td>No cliquering</td>
</tr>
</tbody>
</table>

Results:

<table>
<thead>
<tr>
<th></th>
<th>2HESH11B (oxygen)</th>
<th>2HESH11B (control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour Density (a.u.) (A520 + A420)</td>
<td>12.2</td>
<td>11.8</td>
</tr>
<tr>
<td>Colour Hue (A420 / A520)</td>
<td>1.77</td>
<td>1.75</td>
</tr>
<tr>
<td>Total Anthocyanin (mg/L)</td>
<td>561</td>
<td>559</td>
</tr>
<tr>
<td>Total Coloured Anthocyanin (mg/L)</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Degree of Anthocyanin ionisation (α) (%)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>(A520/A520 HCl) x 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Phenolics (a.u.) (A280 HCl - 4)</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>Chemical Age Index (A520 SO₂ / A520 CH₃ CHO)</td>
<td>0.26</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Graph 4: 2HEM E01A VS. 2HEM E04A

However, the wine that was micro-oxygenated at high rates certainly rates more highly at Vasse Felix, having better colour and the structure to age for longer than the non oaked/non micro-oxygenated wine. The spectral analyses of these wines do not show significant differences except for colour and aging parameters.

These two wines are now being transferred to oak barriques to finish off their maturation so we will review them in another 10 months.

Tasting notes: Robert Paul (9 September 2002)
Wine 1: 2H ESH11B - cliquered and Wine 2: 2H ESH 11B - non cliquered. Verbal citation: A author’s comment

“It may be that not enough oxygen is being used because of concerns about frothing in barrel. Certainly, the really complicated wines looked better on the day. They had more fruit sweetness and rich characters, while the oxygenated wines (cliquered wines) were still reductive and needing more oxygen to open up.”

Observations: From the chemical analyses there is very little difference between the two wines, however at this stage the non-cliquered wine (no oxygenation) has had one aerative racking (approximately 3 mg/L oxygen) has slightly denser colour.

The two cliquerings for 1 minute at 30 kPa would have delivered approximately 2.4 mg/L oxygen which is less oxygen than one aerative racking. The tasting results supported the wine that was non-cliquered (control) however this wine will get another cliquering. We have only cliquered at 30 kPa due to the fact that at the Oenodev (via WineNet Consultants) recommended rate of 30 seconds at 100 kPa, we were getting too much frothing and loss of wine from the barrel.

However, it has been recommended we use an Oenodev barrel plug with overflow system (with no relief system necessary in barrels). We are yet to trial this equipment, but are confident that cliquering of barrels will save the time and labour of one or two rackings.

Post Script: The other use of the cliquer we have trialled is its use to stir Chardonnay lees in barrel using CO₂ / N₂ mix for 1–2 minutes, easier on the cellar hand who does not have to physically stir the barrels, and is less oxidative. However we are still evaluating this trial.

Final summary of observations

Although Vasse Felix has only had 3 vintages experience with micro-oxygenation, we feel we have progressed quite well with this technique. Results are starting to show promise in its use to enhance the quality of our wines.

Our use in ‘structuralising’ the wines pre-SO₂ addition at rates of 40–60 mL/L/month show the most promise. The practicality of incorporating MLF enzymes to incorporate a longer micro-oxygenation period is a procedure we have little confidence in thus we have not gone down this path.

A nother problem we have found is the high turbidity of the wines post ferment. A high level of suspended solids binds oxygen and reduces its availability to carry out the intended reactions. For more effective Oxygen reactions, reduced turbidity post ferment is required. We are not very keen on filtering our red wines early to reduce these turbidities, however if we had a centrifuge we would certainly consider that option. In the meantime we are racking the wines in an attempt to reduce turbidities post ferment before the ‘macro’ oxygenation program can begin.

Initially we have used micro-oxygenation on our lower quality wine batches, and naturally our better batches go to oak barriques. However, wines with good fruit depth, sweetness and natural skin tannins and colour have the building blocks for a more successful ‘structuralisation’ and the potential is much greater with these wines.

Regardless, micro-oxygenation has fitted in well with Vasse Felix’s desire to make red wines that are balanced and ready for consumption on release, having rich fruit, sweet middle palates and tannin structures to enable long term aging.
Wines that have been given larger amounts of oxygen pre-SO₂, post ferment, appear to have the building blocks to absorb more oxygen post SO₂ addition; however it appears the wines act on a pendulum of redox potential and swing between oxidative and reductive states. After the micro-oxygenation programs have stopped they can become quite reductive again, so a low rate of oxygen i.e. 0.5–1mL/L/month can keep these wines fresh.

Our experience of using the ‘cliquer’ is still very limited, however we can see potential in reducing our labour bill by saving one or two rackings (especially with 5,000 barrels to rack).

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