Trends in Australian Winemaking Practice

Simon Nordestgaard
simon.nordestgaard@awri.com.au
AWRI Vineyard & Winery Practices Survey 2016

Purpose

- Track trends in wine industry practices

Status

- Aggregated and plotted data
- Visited ~50 producers and suppliers to discuss data and understand context
- Working on refined plots for a report that will be distributed in 2018
- Presenting preliminary data today on just a couple of winery topics

<table>
<thead>
<tr>
<th>Vineyard Practices</th>
<th>Winery Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>464 responses</td>
<td>227 responses</td>
</tr>
<tr>
<td>26,000 ha</td>
<td>1.3 million t</td>
</tr>
<tr>
<td>(19% ha, 9% n)</td>
<td>(74% t, 47% n)</td>
</tr>
</tbody>
</table>
Cross-flow filtration – most important practice change

“The biggest single advance we have made in quality improvement in the last 25 years”

- Eliminates diatomaceous earth (DE) - OHS & disposal
- Reduced number of filtration stages
- Automation:
  - Can run for long periods unsupervised – night, etc.
- Praised by most but not everyone
  - Expensive to purchase & to replace membranes
  - Low flow rates compared to DE
Lees (high-solids) cross-flow filtration

- Helps to avoid oxidation and product dilution common with rotary vacuum drum filters (RVDF)
- Issues with 1-stage lees cross-flow filtration:
  - Low flow rates
  - Ability to genuinely handle really high solids
- Many big wineries using or looking at using pre-clarification of lees by centrifugation

<table>
<thead>
<tr>
<th>Winery Size</th>
<th>White Juice Lees</th>
<th>Red Ferment Lees</th>
<th>White Juice/Wine Bentonite Lees</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50 t</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>50-1,000 t</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>1,000-10,000 t</td>
<td>20%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>≥ 10,000 t</td>
<td>40%</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
</table>
White juice clarification technologies

- **Settling**
- **Flotation**
- **Centrifugation + flotation**
- **Centrifugation + settling**
- **Centrifugation alone**
- **Decanter+RVDF**

**Flotation:**

(2nd most important process change nominated)

- Faster than cold settling
- Less cooling required
- Less juice in float lees than cold settled lees
- Batch systems very cheap

*Wineries will not always use the second process – e.g. may skip flotation when clarifying juice for higher solids chardonnay ferments.*
Flotation in the wine industry – after centrifugation

- Flotation post-centrifugation has been used in Australia since at least 1983
  (Chan 1984 describes a process similar to above but with N₂ injection in the centrifuge bowl – trying to get definitive references on earliest use)
Flotation in the wine industry – continuous systems

- Early 1990s: many large scale single-stage continuous flotation plants installed around the world, including (only?) one winery in Australia
  - Often used in conjunction with hyperoxidation (appears was popular at the time in Europe)
  - Systems used in conjunction with gelatin & bentonite and sometimes silica-sol & carbon
  - Only suitable for very high throughputs and parcel sizes

Example schematic - Falkenberg (1996) – ASVO proceedings

Continuous separation basin with rotating suction heads to remove floats – new installation (2017)

Example schematic - Falkenberg (1996) – ASVO proceedings
Flotation in the wine industry – batch systems

- Compact cheap batch systems that work without large pressure chambers or specialised separation basins appear to have lead to widespread uptake and acceptance of flotation – mainly in last ~7 years
- Smallest recirculation system costs only ~$6,500 and can even use the pump separately outside vintage
- Lots of continuous systems now being installed in large Aust. wineries (because of batch experience?)
- Survey: Nitrogen most common gas used by every survey respondent using flotation

**Tank-to-tank operation**

![Tank-to-tank operation diagram]

**Recirculation operation**

![Recirculation operation diagram]

Only uses 1 tank - just like cold settling (can’t fill it as high though)
Heat stabilisation - method

Bentonite:
- Only method really being used for heat stabilisation by industry
- Large lees volumes
  - Juice/wine losses/downgrades
- Possible sensory impacts

![Bar chart showing fraction of wineries using heat stabilisation techniques by winery size.](chart.png)
Timing of largest bentonite addition

- ~60% of large wineries add and remove bentonite with their gross yeast lees for part of their production (often added post-ferment, sometimes after lees mixing period)
  - Combines steps and possibly reduces overall lees / increases wine clarity

- ~30% of large wineries are using centrifugation during their major bentonite clarification
  - Reduced lees & no need to recover

- ~20% of large wineries are in-line dosing bentonite on the way to a centrifuge
  - Combines steps, can rack-fine if desired

### Flotation: Bentonite use during flotation may be having an effect on bentonite lees volumes across wineries of all sizes?
Most common bentonite type

- Largest wineries typically use Na-bentonite
  - Cheaper dose for stability and they have lees recovery equipment (RVDF, centrifuges, lees X-flows)
  - But they still sometimes use Na/Ca for smaller volume premium products

- Not captured in the survey explicitly, but there are a lot of flotation specific fining agents being used (e.g. Flottobent, Flottogel, Bent’up, Gel’up)
  - Relative performance? (don’t know)
Chilling with or without KHT seeding is the most common method of cold stabilising in wineries of all sizes.

Smaller wineries do less explicit cold stabilisation because they make more red wine, have higher average price points & longer periods of cold ambient holding pre-bottling (large wineries do similar for their premium reds).

Packaged continuous contact, electrodialysis and ion exchange not used by any respondent.
Cold stabilisation methods – CMC

- Promoted by suppliers as saving a lot of cooling/electricity, being cheap and rapid
  - Current common users seem positive about CMC
- ~20% of wineries using it at all, but only 1 large winery has really adopted as common practice
- Occasional users:
  - Wine needed at short notice
  - Base wines were stable but blend is not
  - Didn’t want to drop wine acid with chilling
  - Small white wine volumes
- Wineries not using:
  - Long-term stability questioned
  - Might need to still pre-chill some wines
  - Problems if is later blended
  - Clauses in sales contracts
  - Not allowed in all export markets
  - Filtration concerns
  - Don’t mind dropping wine acid
  - Negative sensory impacts of CMC
  - Haven’t done sufficient trial work yet
Conclusions

- Were some preliminary excerpts of the survey data
- Will distribute a full report next year
- Will include data on the prevalence of other techniques – yeast types, direct vs. propagation, stuck ferments, YAN measurements, pressing equipment, hyperox, fining agents, timing of malo inoculation, sorting equipment, closures, etc. and vineyard practices
- Hope to repeat something similar every ~5 years
  - Have an independent summary of practices that producers can use for benchmarking and can see how things are changing over time at an aggregate level.
Grape and wine producers who filled out the survey and allowed me to visit/phone
Suppliers who have provided information
Grape and wine associations that helped with survey promotion
Colleagues at AWRI, including Maria Calabrese, Tadro Abbott, Geoff Cowey, Ella Robinson, Con Simos and Eric Wilkes.
Vinitech-Sifel who sponsored a survey lucky draw prize of a trip to their equipment trade show in Bordeaux (congratulations to Sheena High who won the trip)