Comparison of press mode and handling techniques: why and how?

- Pressing technique (inert vs normal operation) can have a noticeable effect on the aroma and phenolic composition of white wine.
- Prevention of very early passive oxygen exposure during ‘inert’ pressing with nitrogen gas was compared with normal ‘aerobic’ pressing in Chardonnay wines.
- Both resultant juices (inert and aerobic) were subsequently vinified using either reductive (protected with extensive dry ice cover) or oxidative handling techniques until the end of post-ferment racking.

2014 vintage vinification and treatment details:
- Chardonnay grapes, Barossa Valley (YAN 200 mg/L ex-vineyard)
- Whole-bunch pressed (Bucher Inertys XPF80); 2,700 kg; 4 press cycles 2 x N₂ and 2 x air; 35 ppm SO₂ as PMS in press buffer tank
- Viniclear pectolytic enzyme 1 ml/L
- Yeast EC1118, no DAP additions, 1.0 g/L bentonite at 10 BÉ
- Pilot-scale fermenters (500 L) x 12, temperature set at 16°C
- Bottled under screwcap with Saran-wrap, minimal total package oxygen (mean TPO 2.1 mg/L)

‘Press mode x handling technique’ results:
- The large amounts of oxygen to which white grapes were exposed during aerobic pressing resulted in juice with lower phenolic load, increased higher alcohols, and modified fermentation esters, amino acids and volatile organic acids.
- Differences due to pressing mode were far greater than those caused by using reductive or oxidative handling techniques, particularly for total phenolics.
- Aerobically pressed juice showed no statistical chemical differences between reductive and oxidative handling techniques.
- Wine made from inertly pressed juice showed subtle differences between handling techniques.

Does the O₂ concentration have at pressing have a direct relationship to chemical composition and fermentation efficiency?
- The previous pressing trial showed a large difference between using 0% and 21% O₂
- This subsequent trial used a pressing gas with different O₂ concentrations: 0% (100% nitrogen), 5%, 10%, 15%, 21% (air).
- Phenolics (Figure 6) and efficiency (Figure 5) showed a dose-effect relationship but low O₂ (< 5%) decreased volatiles (Figure 7).

2016 vintage trial details - pressing with gas of different O₂ content:
- Pinot Gris grapes*, Eden Valley (* courtesy of Hentley Farm)
- Whole-bunch pressed (Bucher Inertys Xplus 30°)
- Five press cycles (1,200 kg each cycle) with different gas each cycle, 35 ppm SO₂ as PMS in press buffer tank
- Laboratory-scale fermentation (5 L) x 15, yeast EC1118, no DAP additions, temperature set at 20°C

Figure 1. Dissolved O₂ inside the tank press (logged using a miniDOT O₂ sensor)
Figure 2. PCA of volatiles, phenolic indices and amino acids
Figure 3. Plots of most variable chemical descriptors
Figure 4. Sensory analysis six weeks after bottling
Figure 5. Increased O₂ exposure at pressing results in a longer time to complete fermentation
Figure 6. Phenolic content in wine is negatively correlated to O₂ content of pressing environment
Figure 7. Variation in summed volatile concentrations with O₂ content of pressing environment