

Does bentonite fining of white wines compromise the utility of lead isotope ratios in wine provenance testing?



Martin P. Day¹, Claire Wright², Jason Kirby², Eric N. Wilkes¹

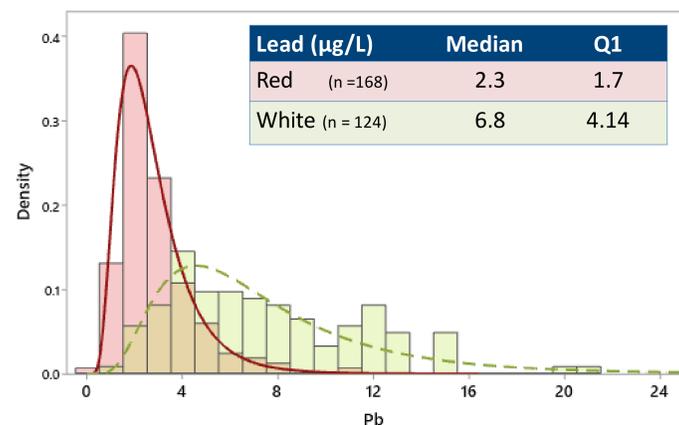
¹ The Australian Wine Research Institute, PO Box 197, Glen Osmond (Adelaide) SA 5064, Australia, ² CSIRO Land & Water, Urrbrae, SA 5064, Australia

Corresponding author's email: martin.day@awri.com.au

Background, aims and method

- ❖ Lead (Pb) isotope ratios have been proposed for use in authenticating the provenance of wines.
- ❖ The effect of bentonites on lead concentrations in wine is well known (Figure 1).
- ❖ **Aim:** to assess whether bentonite fining compromises the use of lead isotope ratios in authenticating wine provenance
- ❖ **Method:**
 - (1) Data mining results from the AWRI provenance study of commercially packaged wines
 - (2) Experiment treating three protein-unstable white wines (mean Pb conc. = 1.2 µg/L) with six different bentonites, at a rate of 1.5 g/L

Figure 1. Distribution (lognormal) of lead concentration (µg/L) of wines in AWRI provenance study identified by grape colour



Results

Figure 2. Normal distribution plots of lead isotope ratios from AWRI provenance study, identified by grape colour (n = 292)

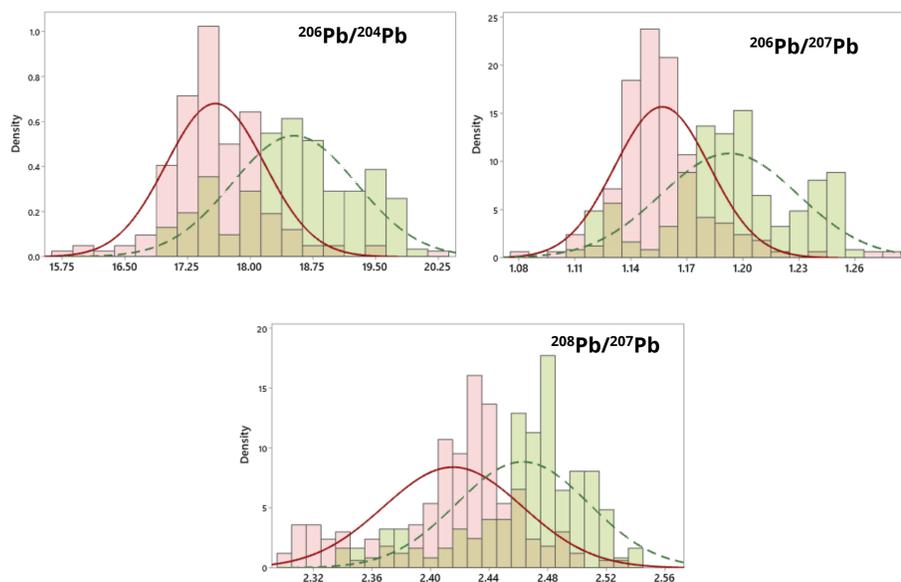
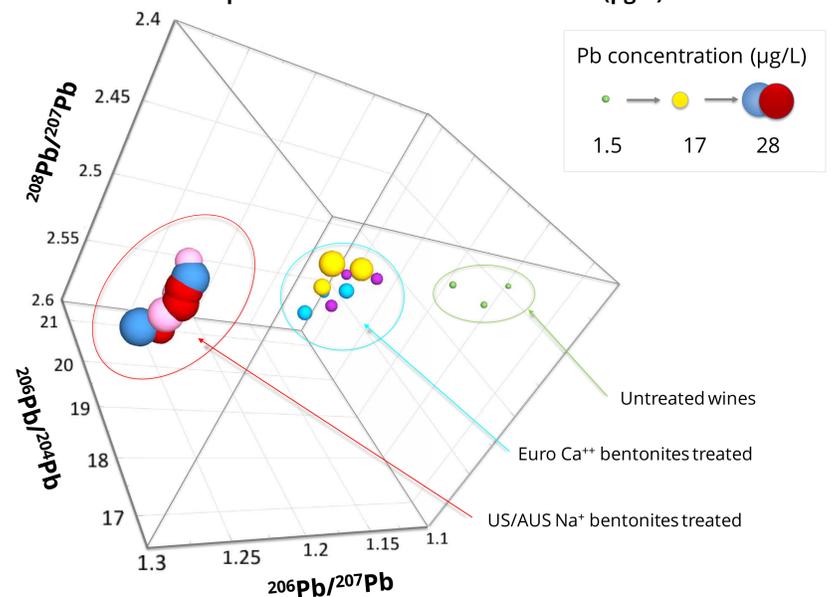


Figure 3. Lead isotope ratios of three white wines treated with different bentonites plotted to show lead concentration (µg/L)



Discussion and implications

- ❖ Lead isotope ratios were higher in white wines (Figure 2).
- ❖ Lead concentration following bentonite treatment ranged from 5 to 30 µg/L (Figure 3, sphere size).
- ❖ Lead isotope signature appears to be characteristic of the specific bentonite used (Figure 3).
- ❖ Average change > 10% observed for the lead isotope ratios $^{206}\text{Pb}/^{204}\text{Pb}$ and 7% for $^{206}\text{Pb}/^{207}\text{Pb}$.
- ❖ Changes for isotope ratios of boron, strontium and lithium were < 1%.
- ❖ **Lead isotope ratios of wines were significantly affected by the use of bentonite => limited utility as a determinant of geographical provenance for wines.**

