INTRODUCTION
Grape marc (skin and seeds) is one of the largest waste streams in the wine industry. In Australia, roughly 15% of the 1.7 million tonne crush (in excess of 255,000 t) is removed as marc each year. There is growing interest in finding uses for wine industry waste streams, especially those that can add value to the winemaking process. As well as common re-use applications such as incorporation into an animal ration, more innovative uses are being sought, including as food additives or health supplements, or conversion into bioplastics for food packaging. It’s important to understand the implications of redirecting agricultural waste, and one aspect of this is any residual agrochemical content. As such, grape marc samples from across a number of Australian wine regions were collected and analysed for a number of viticulturally registered agrochemicals.

GRAPE MARC AND ANALYSIS
• 122 grape marc samples were collected from across Australia.
• Samples were selected based on climatic regions, with temperature and rainfall having a large impact of the prevalence of pests, as well as representing colour of grape, processing and size of winery.
• Samples were analysed for 64 viticulturally registered agrochemicals by AWRI Commercial Services.
• Residue data is expressed relative to the dry matter (DM).

RESULTS
The concentration of agrochemicals (Figure 1):  
- 21 agrochemicals were detected (of the 64 analysed for).
- 13 of these were not found above 1 mg/kg DM.
- Iprodione and cyprodinil were each observed in 45 samples (37%).
- Captan in a single sample was seen at 20.95 mg/kg DM.
- There were no observed correlations between climate, colour or winery size with concentrations or number of agrochemicals detected in each sample.

The number of agrochemicals (Figure 1, inset histogram):  
- Only 15 samples contained no detectable residues (12.3%).
- The majority of samples possessed two or fewer residues (52.5%).
- Ten samples (8.2%) contained six or more different agrochemicals.

Fresh vs processed grape marc (Figure 2):  
- For residues commonly observed or found in high concentration, processed samples contained lower concentrations.
- However, these selected agrochemicals were seen in a higher proportion of processed samples (number above bar).

Agrochemicals by pest (Figure 3):  
- Grouping agrochemicals based on registered purpose suggested differences in types of agrochemicals predominantly used in different climatic regions.
- Residues of agrochemicals used to prevent downy and powdery mildew were more prevalent in warm-wet regions.
- Residues of agrochemicals used to prevent botrytis were less prevalent in cold regions.

CONCLUSIONS
• Lower concentrations of agrochemical residues in processed marc are likely due to aggregation and dilution effects, but residue breakdown may also be catalysed by oxidative handling and heating processes (steam distillation or drying).
• Prevalent agrochemicals, iprodione and cyprodinil (which are registered for use against Botrytis cinerea) were less frequently seen in marc from cold regions.
• Agrochemical content of grape marc cannot be estimated based on the history of the grape marc, except for the potential for lower concentrations in processed or older marc.