AWRI Australian Wine Research Institute

Fact Sheet
WINEMAKING

Case study: consumer acceptance of smoke-affected wines

Background

When wine is produced from grapes that have been exposed to smoke, it can possess unpleasant ‘ashy’ and ‘smoky’ sensory sensations and a lingering aftertaste, commonly described as ‘smoke taint’. To date, the acceptance of such wines amongst consumers has largely been untested.

Effect of differing levels of smoke taint on consumer acceptance

As part of a larger research project on smoke-affected wine, a study was conducted to assess the impact of smoke characters on consumer acceptance. A smoke-affected 2019 Pinot Noir rosé-style wine was assessed in comparison to the same wine blended with varying proportions of an unaffected wine of a similar style from the same vintage. The smoke-affected wine was selected for the study following evaluation by the AWRI smoke taint sensory panel, as well as a separate group of winemakers from several large wine companies, where it was rated as very strong in ‘smoke’ aroma and flavour attributes. The unaffected wine was chosen after comparison of the basic chemical composition and sensory properties of several candidate wines, to match the affected wine as far as possible in colour, residual sugar, acidity and other measures.

The unaffected wine was a commercially available wine from a vineyard that had not been exposed to any smoke events, and this was confirmed through quantitative chemical analysis of smoke volatile phenols and phenolic glycosides.

Five wines were included in the consumer study: the unaffected wine; this wine blended with 6.25%, 12.5%, and 25% of the smoke affected wine; and the smoke-affected wine. The blends for the consumer study were also assessed by the AWRI smoke taint panel and the winemaker panel. Information about the concentrations of volatile phenols and phenolic glycosides in the these wines can be found in the AWRI fact sheet 'Remediation of smoke-affected wine by dilution'.

Eighty-two regular rosé wine consumers (aged 18-65 years, 62% female, 38% male) rated each wine for overall liking on a nine-point hedonic scale from 'dislike extremely' to 'like extremely'. The wines were assessed blind in the AWRI sensory facility, and were presented in black glasses to avoid any cues from the slight differences in colour between the wines. The consumers were not given any information about the purpose of the tasting.

A highly significant difference ($P<0.001$) was found among the wines, with the mean liking data shown in Figure 1. The liking score for the smoke-affected wine was very low, with a mean value of 3.7 on the nine-point scale. A rule of thumb for consumer testing using the hedonic scale is that a value of 6.0 or above indicates a well-accepted product (Francis and Williamson 2015), and less than 5.0 indicates a poorly accepted product. The unaffected commercially available Pinot Noir rosé wine was well-liked, as expected, with a score of 6.4.

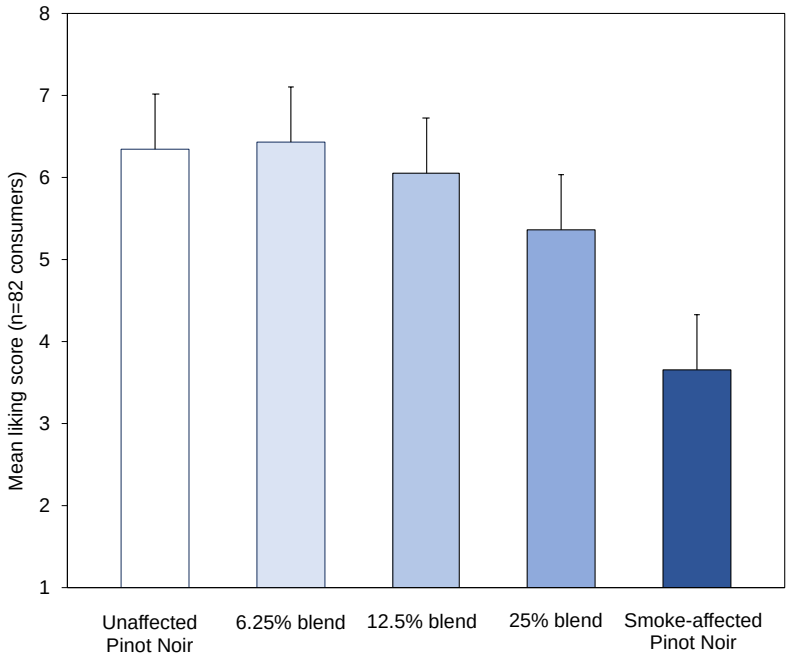

Figure 1. Mean consumer liking scores for an unaffected Pinot Noir wine and the same wine blended with 6.25%, 12.5% and 25% smoke-affected Pinot Noir wine, compared to the 100% smoke-affected wine. Consumers' liking response was measured using the standard nine-point hedonic scale: dislike extremely (1) to like extremely (9). Wines with mean values greater than 6.0 can be considered well-accepted.

The liking scores for the unaffected wine and the same wine blended with 6.25% of the smoke affected wine were similar, indicating that the addition of this proportion of the smoke-affected wine did not have a negative effect on consumer liking. This matched data from the AWRI trained panel and the winemaker panel, where there was no significant difference in smoke attributes between the unaffected wine and the 6.25% blend.

The 12.5% and 25% blends were lower in liking score, with the 25% blend being well below the score of the unaffected wine. Overall, there was a strong negative correlation between the proportion of the smoke-affected wine in the wines tasted by the consumers and their liking score (correlation coefficient -0.985, P=0.002).

Most consumers strongly disliked the smoke-affected wine

Statistical cluster analysis of the patterns of the liking scores identified three groups of consumers who, within each group, had the same preference responses. While only a relatively small number of consumers were recruited for the test, meaning the clusters identified may not be robust, nevertheless there were insights that could be drawn from this analysis.

The largest cluster of consumers (46% of the total number of consumers tested), showed the strongest negative response, giving a very low liking score for the affected wine (mean score 2.7), and scoring the 12.5% and 25% blends significantly lower than the unaffected wine. This cluster had the highest percentage of consumers with less than 10 years of wine drinking experience.

The second largest cluster (33%) also responded negatively to the smoke-affected wine (mean score 2.8), but the three blends were not scored lower than the unaffected control.

The smallest cluster, only 21% of the consumers, did not give lower liking scores to the smoke-affected wine compared to the unaffected wine, and all wines were well-liked. This suggests that these consumers were not sensitive to smoke, or were tolerant of the sensory characteristics it provides. This behaviour has been found in other AWRI consumer preference studies involving faults and taints, with a similar proportion of non-discriminators. It was found that there were fewer younger people in this cluster and more consumers with 20 or more years of drinking experience. Members of this cluster were also more likely to select a rosé wine as their first choice in different drinking scenarios.

Conclusions

Results from this study show that a smoke-affected wine is not accepted by consumers. The case study provides evidence that even a small proportion of smoke-affected wine in a blend can seriously affect consumer acceptance. Only a minority of consumers did not respond negatively to smoke.

Since this study was completed, two more consumer studies have been conducted, with 124 consumers assessing smoke-exposed unoaked Chardonnay diluted at different rates with a non-smoked control wine, and 111 consumers assessing unoaked Shiraz wines from single vineyards exposed to a range of smoke impact from early-season smoke in the Adelaide Hills. The findings

described above held true in other varieties, with the same pattern of consumer liking and clustering. However, the intensity of the smoke flavour that was disliked by consumers varied slightly according to the variety, so it was not possible to determine an absolute intensity of smoke flavour disliked by consumers that can be generalised across varieties. Rather, the level of smoke flavour that is distinguishable to the trained panel above a non-smoked control is highly indicative of the level at which the liking of sensitive consumers is affected.

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References and further reading

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