Understanding consumers' perceptions of smoke-affected wines

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Smoke taint in grapes and wine is complicated. If a vineyard is exposed to smoke, there are a whole range of factors that determine whether or not the wine eventually made from those grapes will be smoke-affected and to what degree. While many of those factors are now quite well understood[1, 2], questions still remain about what consumers think. Do they notice smoke characters in wine? Do they like or dislike them? How strong do smoke characters need to be to cause a reaction in consumers? And are all consumers the same when it comes to smoky wines?

Three recent consumer sensory studies at the AWRI aimed to learn more about the answers to these questions. This article presents a summary of the results and conclusions of this work. Full details were recently published by Bilogrevic *et al.* (2023)[3] as an open access article in the peer-reviewed journal, *OENO One* (https://doi.org/10.20870/oeno-one.2023.57.2.7261).

What was done?

Three different sets of wines were assessed by panels of regular Australian wine consumers, with no links to the wine industry. The wines were:

(1) vintage 2020 Adelaide Hills Shiraz wines from a study investigating the chemical composition of wine after a single early season smoke event[4]. Each of the wines were made in an identical fashion from vineyards with different degrees of smoke exposure, and no oak contact. The set of wines ended up with a range of concentrations of smoke volatiles and glycosides and a range of levels of smoke character. Control wines made from grapes with no known smoke exposure were also included. Six wines were presented to consumers.

(2) A 2019 Pinot Noir rosé-style wine, made from smoke-exposed grapes from Tasmania's Huon Valley, a control 2019 Pinot Noir rosé-style wine made from Adelaide Hills grapes not exposed to smoke, and blends of these wines in different proportions to achieve a range of levels of smoke character. Five wines were presented to consumers.

(3) A 2020 unoaked Chardonnay wine, made from smoke-affected grapes from north-east Victoria, a control 2020 Chardonnay wine made from Barossa grapes not exposed to smoke, and blends of these wines in different proportions to achieve a range of levels of smoke character. Five wines were presented to consumers.

In each study, consumers rated wines presented to them in randomised order, under controlled conditions, giving scores for overall liking on the nine-point hedonic scale from "like extremely" to "dislike extremely"[5]. The Shiraz (111 participants) and Pinot Noir (82 participants) assessments were carried out in Adelaide, SA and the Chardonnay assessments (124 participants) were carried out in Melbourne, VIC.

All wines had also previously been assessed by a trained smoke taint panel, to determine the intensity of smoke flavour in the wines. This allowed the consumer liking scores to be compared to a quantitative assessment of the wines' sensory characteristics.

What did the results show?

For the three sets of wines there was a clear negative correlation between consumer liking scores and smoke flavour scores from the trained sensory panel (Figure 1). Generally, the 'clean' control wines and a few wines with low smoke flavour scores were well liked (liking scores above 6), but overall, liking decreased as smoke flavour increased.
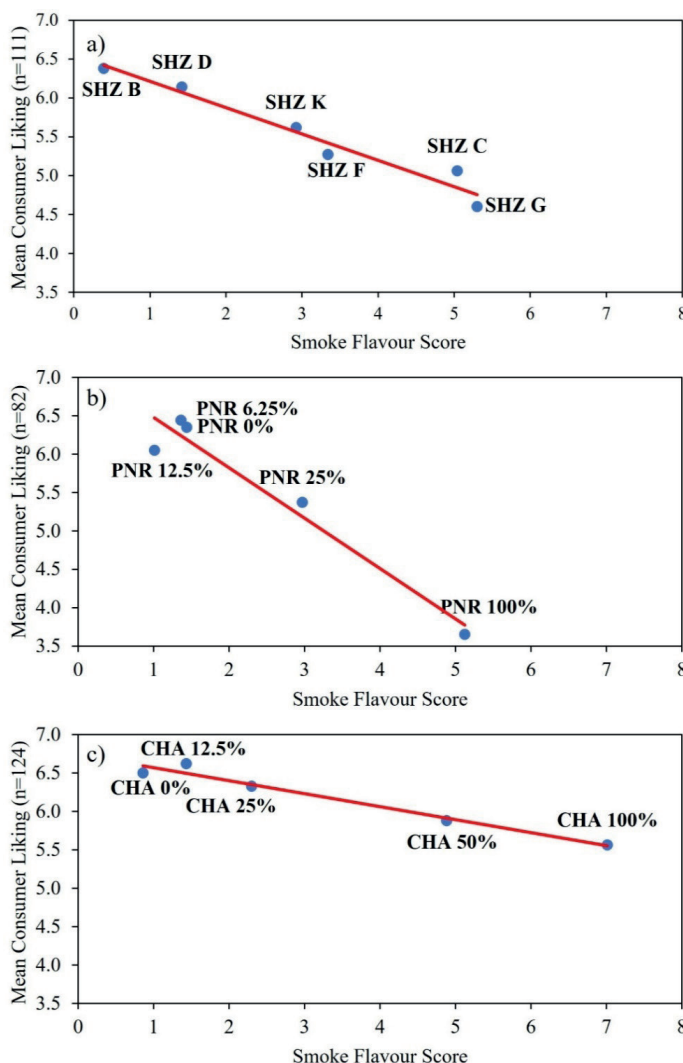
FIGURE 1. The relationship between the mean sensory smoke flavour intensity rating from a trained sensory panel and the mean consumer liking score for the three sets of wines. This figure was first published by Bilogrevic *et al.* (2023)[3] in the journal *OENO One* and is reproduced here under a Creative Commons Attribution License.

While the trends seen were similar across the three styles of wines, the slopes of the regression line varied, suggesting the matrix affected how consumers responded to the smoke flavour. Higher levels of smoke flavour were more tolerated in this set of Chardonnay wines than in the Shiraz and Pinot Noir rosé wines.

Cluster analysis was also applied to the liking score data to see if different groups of consumers could be found. For the Shiraz study, three clusters of participants were identified, with responses from two clusters correlating closely with the overall mean data, just varying in the use of the scale. The third, much smaller cluster, did not seem particularly responsive to smoke characters and gave a low liking score for a non-smoke affected wine. For the Pinot Noir rosé wines, there was some evidence of clustering within the participants, but not as strong as for the Shiraz data. For the Chardonnay wines, there was strong evidence for clustering. One cluster seemed quite sensitive to smoke characters, with progressively lower liking scores for wines with higher smoke ratings. A second cluster only really registered a negative response to the wine with the highest smoke rating, and a third did not register significant differences between the wines.

What does this mean for wine producers?

The results of these three consumer studies clearly showed that smoke characters in wine negatively affect consumer preference, across different wine styles. Generally, consumers seemed to fall into one of three main categories: those who were very responsive to smoke characters, those who were moderately responsive to smoke characters and a small percentage who did not respond to smoke flavour at all. The group of consumers who responded most negatively, a sizeable group in each study, were affected by smoke characters at the same levels as those detected by trained expert sensory panels. There was no evidence for any consumer group preferring wines with smoke flavour.

Differences were seen across the three different wine styles in terms of the intensity of smoke characters that had an effect on consumer liking. While not surprising, given what is known about the influence of background sensory properties of wine in suppressing or complementing other flavours, this does mean that there's not one simple answer for all wine types to the question of how much smoke is too much for consumers. It will therefore continue to be important for both sensory and chemical analysis to be used when assessing wines made following vineyard smoke exposure.

Conclusions

By conducting consumer studies with three different sets of smoke-affected wines, a clearer picture of the impact of smoke characters in wine on consumer acceptance has been achieved.

The full data published from this work (available from: https://doi.org/10.20870/oeno-one.2023.57.2.7261) will help producers make informed decisions about how best to manage smoke-affected wines, taking into account likely consumer responses. ∎

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3 Bilogrevic, E., Jiang, W., Culbert, J., Francis, L., Herderich, M., & Parker, M. (2023). Consumer response to wine made from smoke-affected grapes. *OENO One, 57*(2), 417-430. https://doi.org/10.20870/oeno-one.2023.57.2.7261

4 Jiang, W., Bilogrevic, E., Parker, M., Francis, I. L., Leske, P., Hayasaka, Y., Barter, S., and Herderich, M. (2022). The effect of pre-veraison smoke exposure of grapes on phenolic compounds and smoky flavour in wine. *Australian Journal of Grape and Wine Research*, 2022, https://doi.org/10.1155/2022/9820204

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