Flavour Additives Influence the Sensory Perception and Consumer Liking of Australian Chardonnay and Shiraz Wines

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Aims
Flavour additives are commonly used in foods and beverages to enhance quality and meet consumer expectations, so it is reasonable to make the assumption that this would also be true in wines. The aims of this study were to determine Australian wine consumers’ acceptance of the use of flavourings in wines and to explore the impact of natural flavour additives on the sensory perception and consumer liking of Chardonnay and Shiraz wines.

Online consumer survey
Australian wine consumers (n=1031) completed an online survey, exploring their acceptance of and attitudes toward the use of additives in wine.

Consumer acceptance tasting
Australian wine consumers rated their liking of control vs. flavoured Chardonnay (n=107) or Shiraz (n=111) wines. Consumers were asked to indicate their liking of each wine using a nine-point category scale, where 1=“extremely dislike” and 9=“extremely like”. Subsequent segmentation was performed based on liking scores which identified three clusters for each of the white and red wine tastings.

Partial Least Square Regression (PLSR)
PLSR was performed to explore the contribution of individual sensory attributes on consumer preferences for control and flavoured wines. Sensory attributes are displayed along the x-axis, while regression coefficients for consumer liking are on the y-axis. Results of PLSR of Chardonnay demonstrate a strong negative influence of green aroma on the liking for C2 consumers. C3 liking is positively influenced by butter aroma and honey flavour and negatively influenced by oak flavour. PLSR of Shiraz wines suggests confectionary and red berry aromas strongly influenced liking for C3 consumers, but negatively influenced liking for consumers from C1.

Conclusions
- Australian wine consumers were more accepting of natural flavourings than currently used wine additives.
- Flavour additives significantly increased the intensity of attributes (e.g. citrus aroma and oak flavour) and decreased undesirable attributes (e.g. green and earthy notes) in wines.
- Lower quality wines could be made more palatable to some consumer segments by the addition of corrective flavourings.

Acknowledgements:
This research was supported by Wine Australia. We would also like to acknowledge FlavorSense and The Product Makers for provision of flavour additives; Camille Simun and Juliette Escotes for technical assistance with wine analysis; descriptive analysts of wines panelists; and consumers who participated in wine sensory evaluations. Finally, we thank industry partners for their generous donation of wines.

Descriptive analysis and consumer tastings

Descriptive analysis panels for white (n=11) and red (n=12) wines identified a significant increase in the intensity perception of attributes in the flavoured wines (i.e. citrus aroma and oak flavour) and a decrease in undesirable characteristics in some treatments (i.e. green and earthy). The addition of flavourings has also changed some taste and mouthfeel attributes possibly due to cross model interactions.

Figure 1: Consumer acceptance of wine additives according to their wine knowledge segments, where 1= “highly knowledgeable”, and 9= “highly acceptable”. (p<0.05) one-way ANOVA, Fisher’s LSD.

Consumers considered natural flavourings, natural colour and additives associated with health benefits (e.g., vitamins) to be acceptable food additives, irrespective of their level of wine knowledge. In contrast, the use of common winemaking additives such as tartaric acid, preservatives, oak chips, and tannins, was considered far less acceptable, particularly, by less knowledgeable consumers.

Based on this finding, we chose to investigate the potential for natural flavourings to enhance aroma and flavour and to explore consumer liking of flavoured wines. Four inexpensive commercial wines (two Chardonnay and two Shiraz wines) were chosen along with a range of natural flavourings which were added to base wines to intensify aroma and flavour.

Figure 2: Spider plots showing mean intensity scores for the aroma (A), flavour (F), taste and mouthfeel attributes of control and flavoured (a) Chardonnay and (b) Shiraz wines. Asterisks (*) denote statistical significance at p = 0.05.

Figure 3: Partial Least Squares (PLS) regression for control and flavoured Chardonnay and Shiraz wines, according to liking segments (C1, C2, C3).

CH1: CH3; CH4: CH7; CH8: CH10

SH1: SH2: SH3; SH4; SH5: SH6; SH7: SH8; SH9: SH10

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