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THE UNIVERSITY OF ADELAIDE AUSTRALIA

Final report

Consumer evaluation of wine product vs. wine based beverage

wfa Partner
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Executive summary:

1) A market simulation forcing respondents to make trade-offs between several wine attributes showed that labelling only has a small impact on the purchase decision for cask wine (2.1%).

2) The market simulation revealed that Wine is most preferred and Wine Based Beverages are least preferred by consumers. Wine Products are located in between both, with a higher preference than Wine Based Beverages.

3) The perceived preference difference between a Wine Product and a Wine Based Beverage revealed by the choice experiment equals a value of $1.24 for the average Australian wine consumer.

4) A direct attribute evaluation of product types shows congruent results; with a Wine Product and a Wine Based Beverage being perceived significantly different on average. However, an individual analysis reveals that only about 40% of respondents perceive a Wine Based Beverage to be less desirable than a Wine Product.

5) An analysis of the impact of providing respondents with the definition of a Wine Product revealed that around one-half of Australian wine consumers reduce their evaluation of a Wine Product once they learn about the allowed production methods.

6) Comparing which production methods consumers think to be allowed for the three product types, the use of the term “Wine Based Beverage” appears to better indicate to consumers that components other than fermented grapes may be included in the beverage.

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1) Consumer sample

(See Figure 1 on next page)

A total of 3,986 respondents started our survey, of which 3,869 were eligible to drink alcohol and had no involvement or direct relationship with the wine industry or market research.

a) Respondents who did not drink wine (16.6%) were screened out.

b) Because the choice experiments were limited to white cask wine products we screened out those wine consumers who exclusively drink red wine. This proportion is only 7.8% of all wine consumers and does not impede the ability to generalise our results to the population of Australian wine purchasers.

c) In the next step we screened out respondents who consume wine, but who did not purchase wine in the last three months (8.2%), as we wanted consumers to have recent purchase experience. As the labelling of *wine products* only is relevant to cask wine we also excluded those consumers who exclusively drink bottled wine (38.7%).

Thus, relative to all consumers who purchase any wine, 57.8% purchase cask wine at least occasionally. This group is the target group of our survey as they are exposed and might be affected by the labelling of alcoholic beverages as wine, wine product or wine based beverage.

After excluding random responses (see Appendix 2f) a total data set of **1,112 consumers** remains which forms the basis of all results reported.

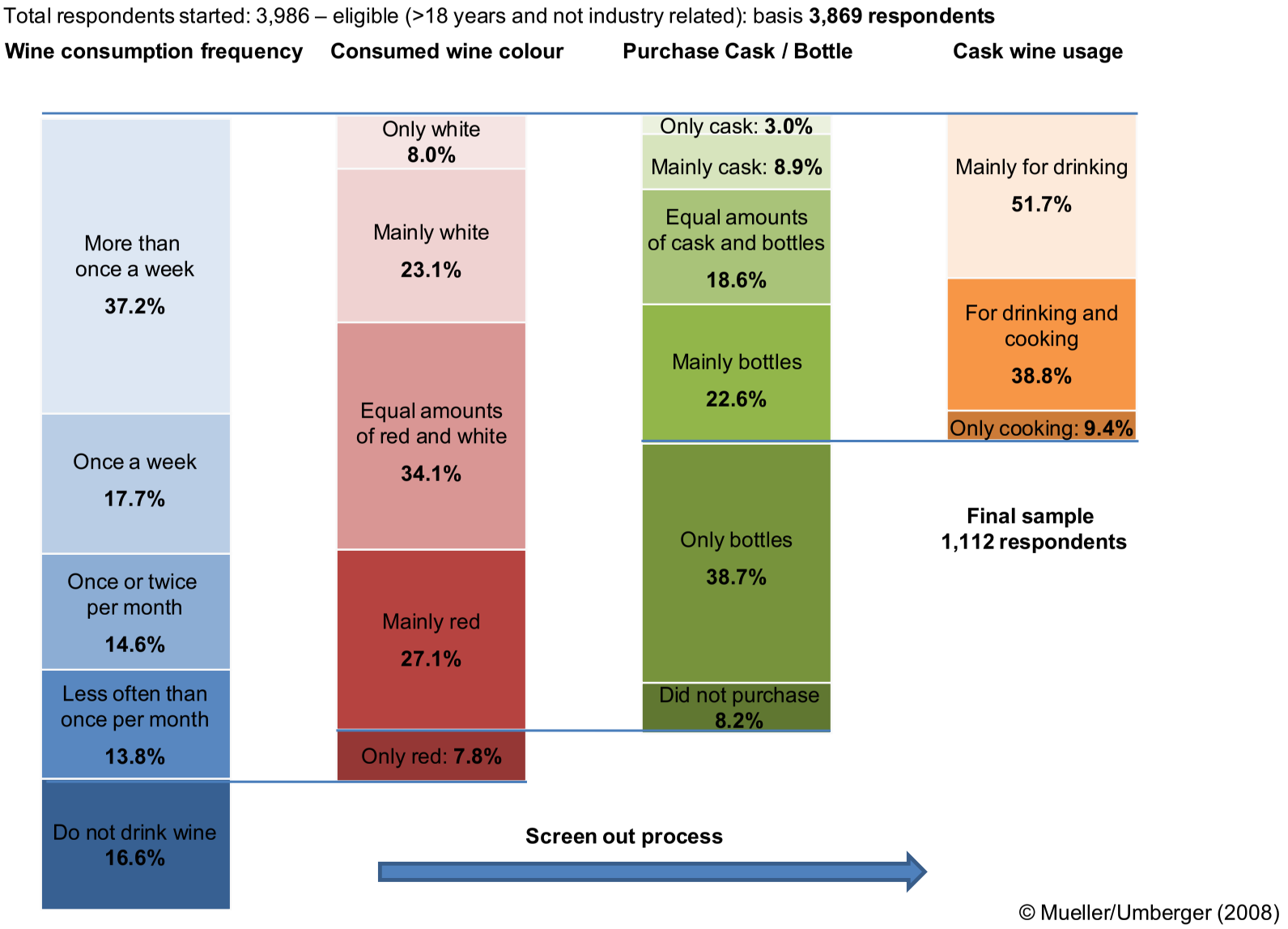


Figure 1 Screening out process and final sample

Table 1: The sample (1,112 respondents) is highly representative of Australian wine consumers (compared to Roy Morgan Single Source Australia Jan 2006 – Dec 2006).

		Roy Morgan (total wine consumers)	**Cask wine survey** (n=1,112)
State	NSW	34.3%	36.3%
	Victoria	25.7%	25.4%
	Queensland	18.4%	17.9%
	South Australia	7.7%	7.9%
	Western Australia	10.8%	9.5%
	Tasmania	2.3%	2.4%
	Northern Territories	0.6%	0.4%
Area	Capital Cities	65.3%	65.3%
	Country Area	34.7%	34.7%
Gender	Female	52.2%	52.4%
	Male	47.8%	47.6%
Age	18-24	8.2%	7.7%
	25-34	16.1%	14.8%
	35-49	31.4%	31.2%
	>50	44.3%	46.2%
Marital status	single	30.7%	28.1%
	married/ de facto	69.3%	71.9%
Children in household	yes	31.8%	35.0%
	no	68.2%	65.0%
Number of children	1	13.3%	13.6%
	2	12.7%	14.0%
	3+	5.7%	7.4%
People living in household	1-2 People in HH	45.9%	50.4%
	3-4 People in HH	41.4%	37.8%
	5+ People in HH	12.8%	11.8%
Personal income (AUD)	Under $20,000	18.1%	20.4%
	$20,000 to $29,999	12.0%	11.6%
	$30,000 to $49,999	25.5%	23.2%
	$50,000 to $69,999	19.8%	19.2%
	$70,000 or More	24.7%	25.5%
Education	Some Secondary/Tech.	14.6%	16.7%
	Finished Tech./HSC/Year 12	34.1%	20.9%
	Have Diploma or Degree	51.3%	62.4%
Employment	full time work	47.7%	43.9%
	part time work	20.3%	19.2%
	not employed	32.0%	36.9%

2) Market simulation

In a market simulation (discrete choice experiment) we asked respondents to repeatedly (16 times) choose their most preferred product from four alternatives to have for an everyday consumption occasion. Respondents had no extra information regarding labelling of the products, so this simulation measures the impact of labelling on choices as available in the current market. There were always two wines, one wine product and one wine based beverage as shelf alternatives available to consumers.

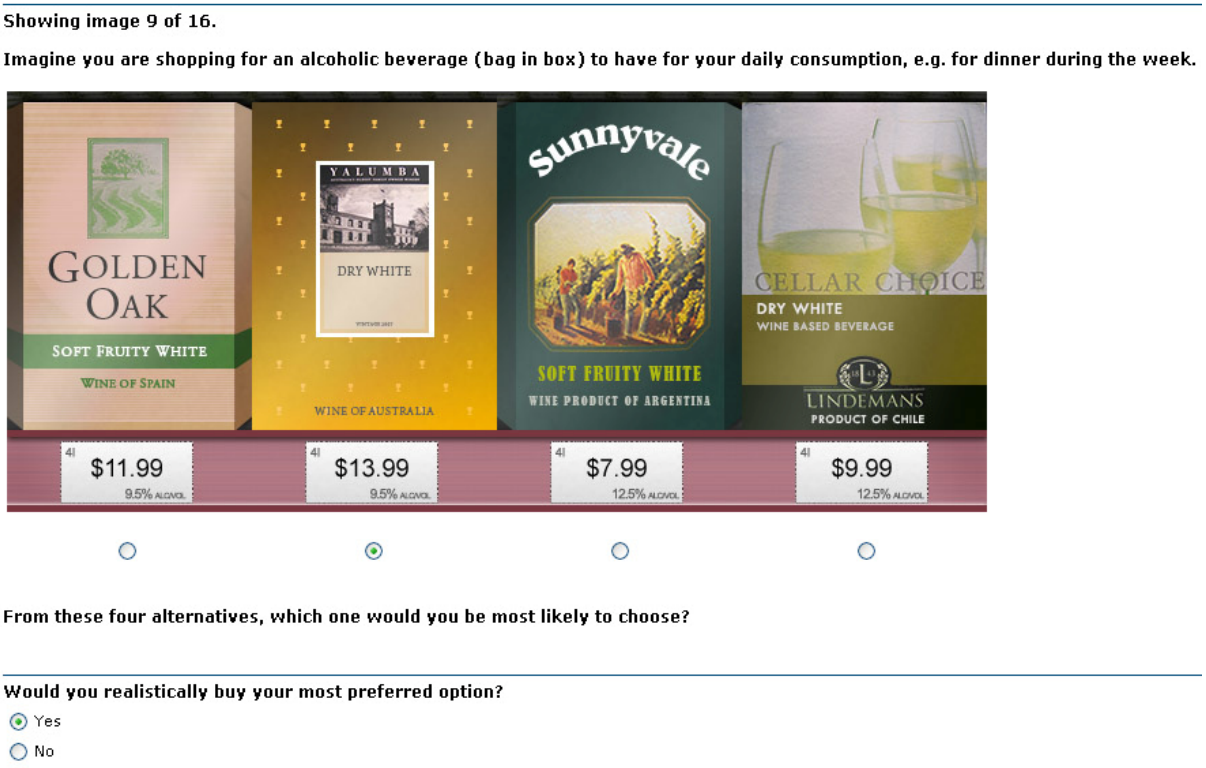


Figure 2 Screen shot of choice task

The combination of the following purchase relevant attributes and levels allows us to independently estimate the relative utility (preference) for each attribute level and the relative importance of the attribute for the purchase decision.

Table 2: Attribute and levels

Attribute	**Levels**	**1**	**2**	**3**	**4**
Price per 4 Litre carton	4	$7.99	$9.99	$11.99	$13.99
Brand (with typical label)	4	Sunnyvale	Golden Oak	Lindemans	Yalumba
Labelling	4	Wine	Wine	Wine Product	Wine Based Beverage
Country of Origin	4	Australia	Argentina	Chile	Spain
Alcohol level	2	9.5%	12.5%		
Wine type	2	Dry White	Soft White		

The choices of respondents revealed the relative importance of the six attributes:

Table 3 Attribute importance for aggregated model

Relative importance	
Country of Origin	52.8%
Brand	22.0%
Price	21.7%
Labelling	2.1%
Wine type (sweetness)	1.3%
Alcohol Level	0.1%

On the aggregate level over all consumers, wine labelling only has a small impact on the purchase decision. It is the fourth most important attribute with 2.1% of importance for the purchase decision. Most important are country of origin, brand and price. Wine type and alcohol level are less important than wine product labelling.

Analysis on segment level revealed that there is strong heterogeneity for the preferred level of sweetness, the importance of country of origin, brand and labelling. For three of six consumer segments labelling has no significant influence on wine choice.

The relative probability with which respondents choose wines with certain attribute levels is presented graphically and discussed on the following page:

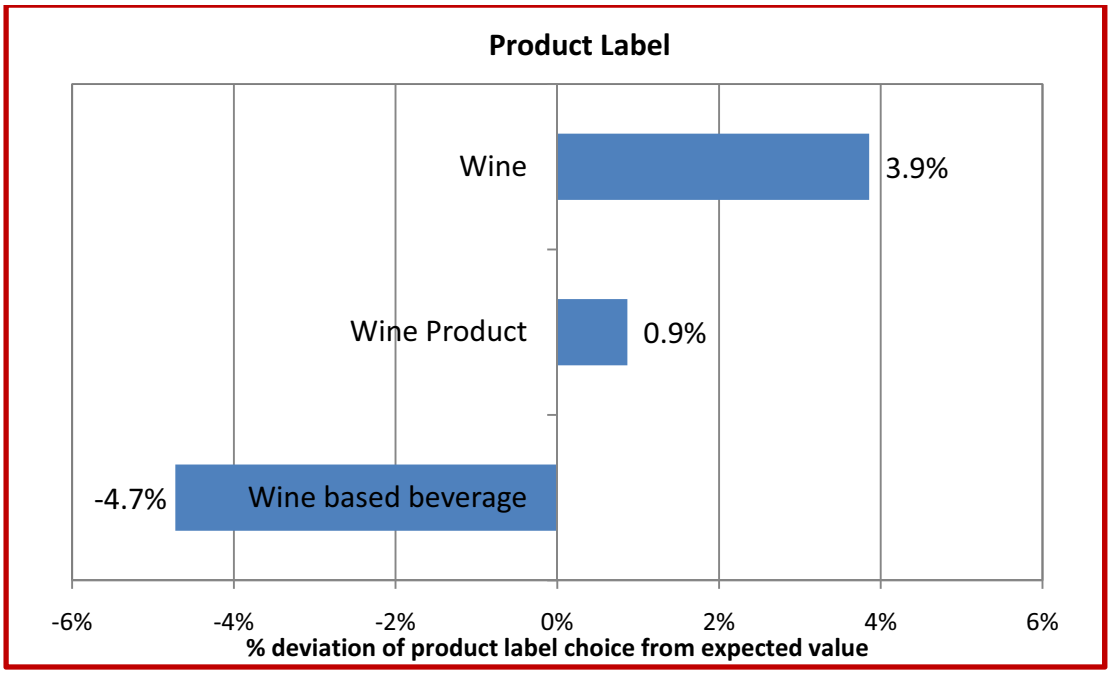


Figure 3 Relative choice of attribute levels for labelling

Overall, labelling has no strong influence on wine choice (only 2.1%), but *wine* is strongly preferred to *wine products* and *wine based beverages*, with *wine products* being in the middle. This provides evidence that consumers perceive *wine products* to be closer to *wine* than to *wine based beverages*.

If a product is labelled as *wine* it is 3% more likely to be chosen than if it were labelled as a *wine product*. Standardising this value by the price estimate equals a price difference of $0.59. Therefore, if a *wine product* is priced $0.59 lower than *wine* then it has the same likelihood of being chosen by the average cask wine consumer.

If a product is labelled as a *wine product* it is 5.6% more likely to be chosen than if it is labelled as a *wine based beverage*. Standardising by the price coefficient results in a price difference of **$1.24**. Thus, if a *wine based beverage* is priced $1.24 lower than a *wine product* then it has the same probability of being chosen by the average cask wine consumer. Thus, the perceived difference between a *wine product* and a *wine based beverage* equals **$1.24**.

Similarly, the choice probability difference between *wine* and a *wine based beverage* is 8.6% (equal to $1.83). Holding all other attributes equal, a *wine based beverage* has to be sold at a price of $1.83 lower than *wine* to have the same chance of being purchased.

The following discussion compares the relative impact on consumers' cask wine choices of changes in the other five attributes: country of origin, brand, price, wine style and alcohol level.

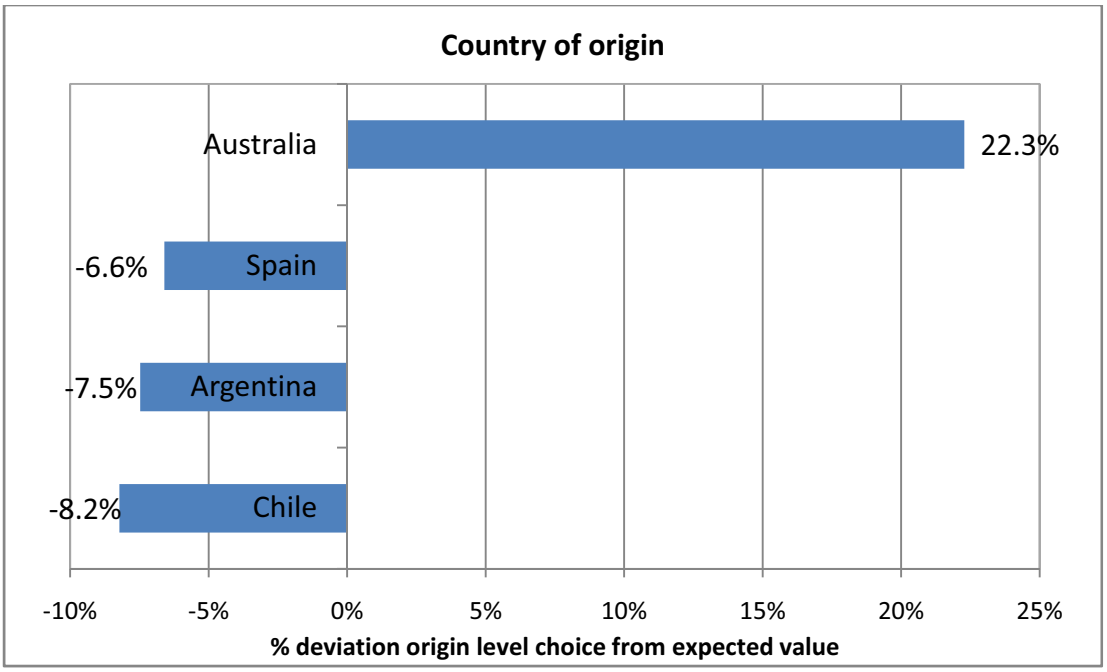


Figure 4 Relative choice of attribute levels for country of origin

Country of origin had the largest impact on cask wine choices. Products of Australian origin were chosen 22.3% more often than by chance and 30.5% more often than Chilean products. Generally, imported products are strongly less preferred, with South American products being least preferred.

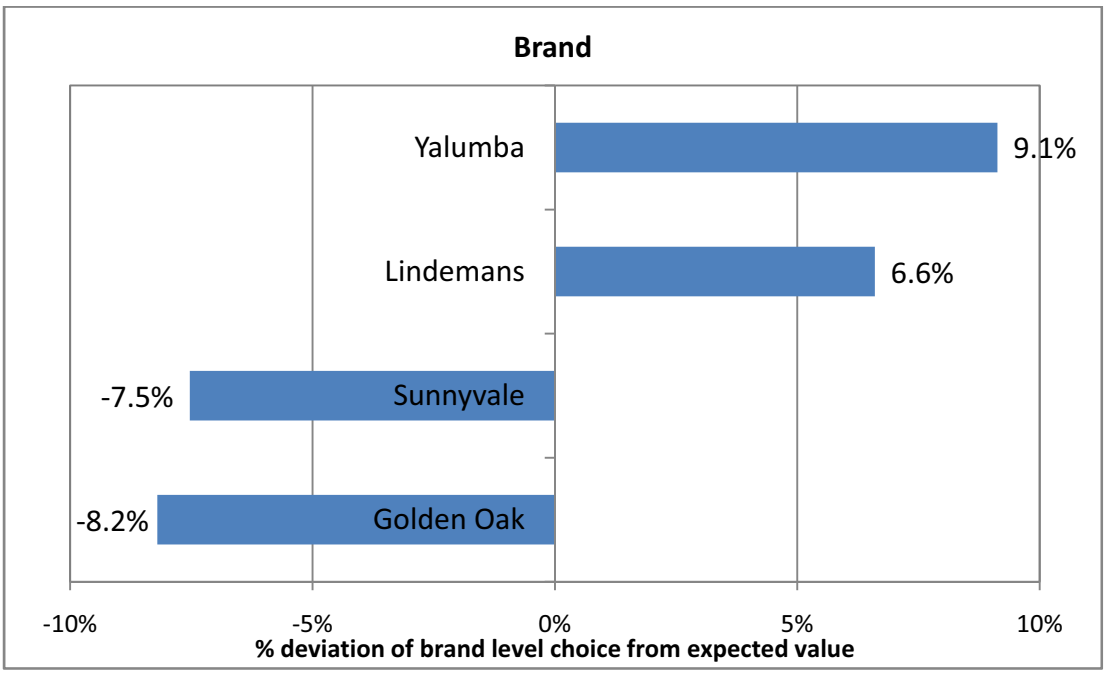


Figure 5 Relative choice of attribute levels for brand

Brand had overall the second highest impact on product choice; Yalumba and Lindemans were preferred over Sunnyvale and Golden Oak, two brands that are dominantly used for *wine products*. Taking the brand into consideration in our choice experiment allowed us to separate the branding effect from the product labelling effect.

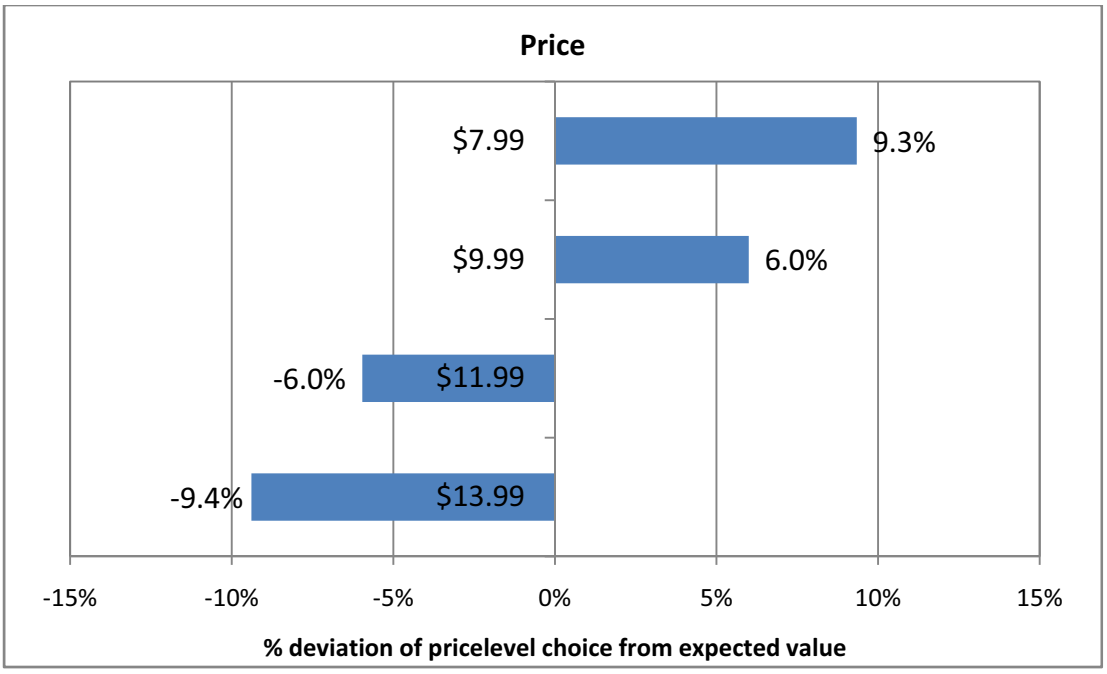


Figure 6 Relative choice of attribute levels for price

As expected, at the aggregate level consumers are price sensitive; they prefer lower prices to higher prices. $10.00 was confirmed to be a psychological price barrier above which the likelihood to be chosen drops substantially (minus 12% from $9.99 to $11.99).

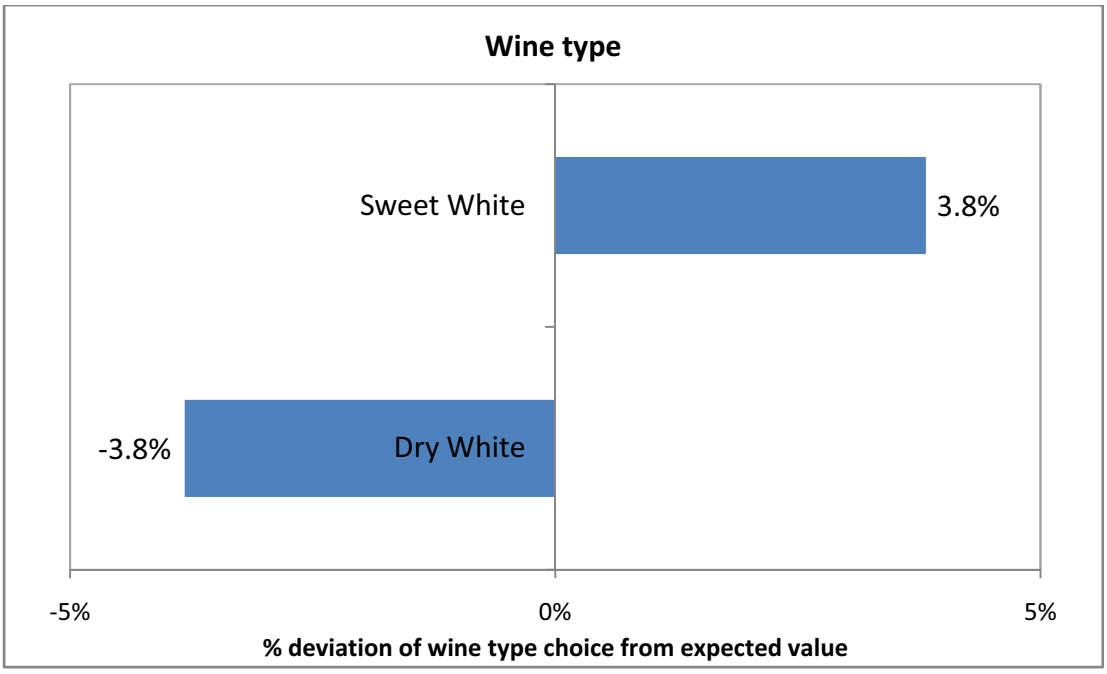


Figure 7 Relative choice of attribute levels for sweetness/wine type

Overall, sweet white is slightly more preferred than dry white on the aggregate level. Segmentation shows that there are distinct segments preferring sweet and dry products, as expected. Thus, wine type becomes more important for product choice at the segment level.

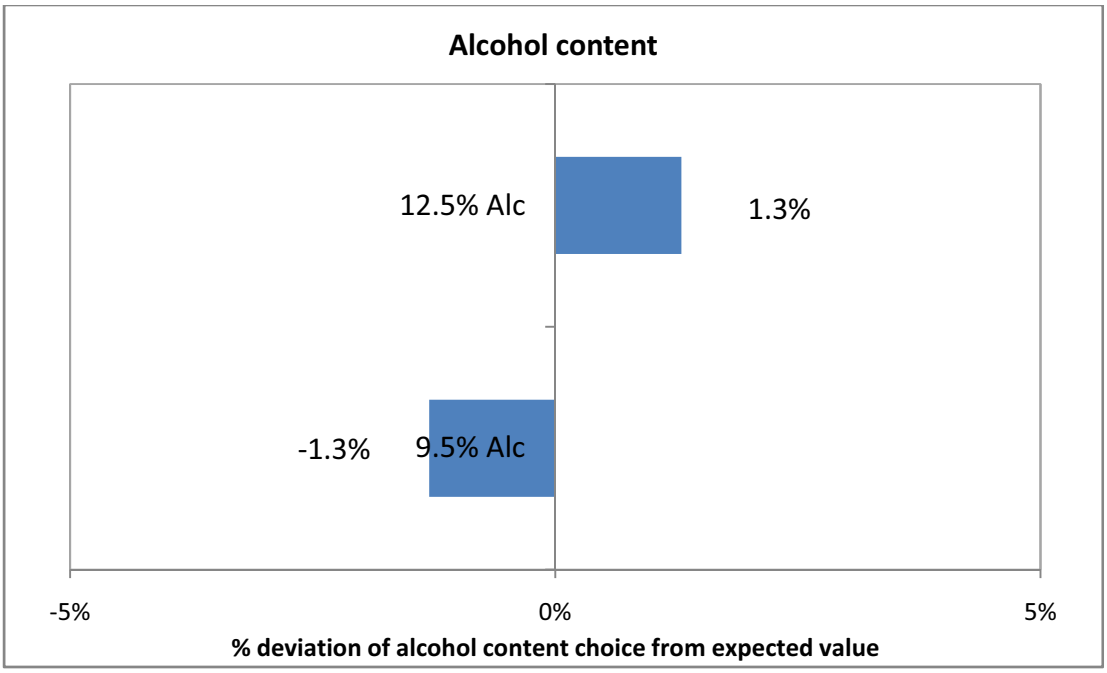


Figure 8 Relative choice of attribute levels for alcohol level

Alcohol level had the weakest influence on product choice with higher alcohol product being slightly preferred over lower alcohol product.

3) Direct consumer product evaluation

After completing the choice tasks, we asked respondents to evaluate *wine*, *wine products* and *wine based beverages* using attribute scales to evaluate each product separately (see example for *wine* below). In the overall evaluation summary, the item 'adulterated product' was excluded because it did not vary together with the other attributes and the analysis results suggested that it is a separate cognitive factor for respondents.

Table 4 Example of product evaluation question

Please indicate how much you agree or disagree with each of the following statements when a product is labelled as "Wine".

	Wine						
	Totally disagree 1	2	3	Neither 4	5	6	Totally agree 7
Labelling example if of Australian origin	***Wine of Australia***						
Is of high quality	○	○	○	○	○	○	○
Tastes good	○	○	○	○	○	○	○
Is a natural product	○	○	○	○	○	○	○
Is an adulterated product	○	○	○	○	○	○	○
Is something I would consider purchasing.	○	○	○	○	○	○	○

a) Aggregated analysis

Consumers' average evaluations (min: 4 points; max: 28 points) of the three products before receiving any product information are shown in the graph below:

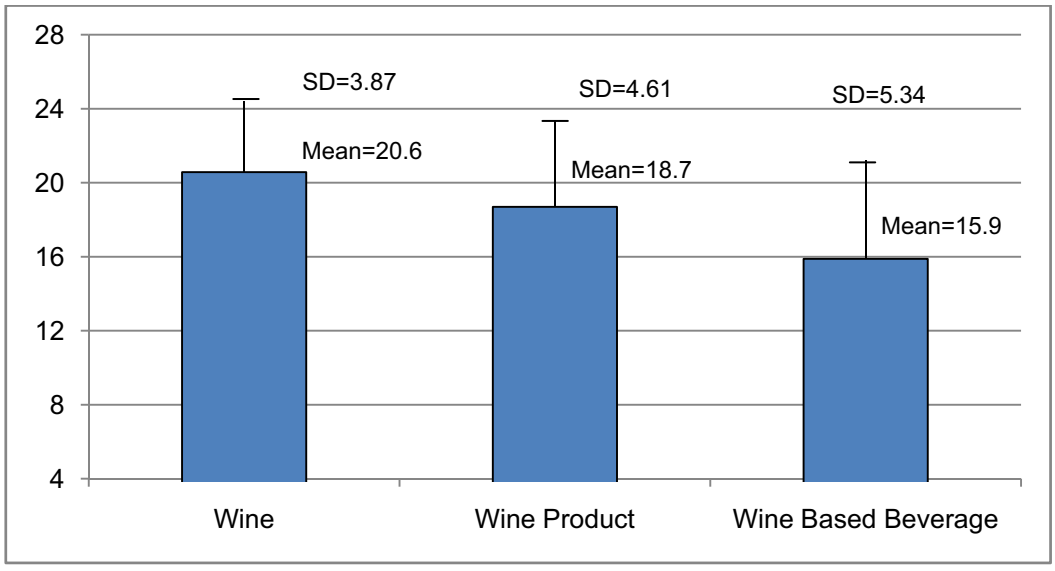


Figure 9 Product evaluation before information

Consumers' perceptions of *wine products* and *wine based beverages* are significantly different, with *wine based beverages* being less preferred. *Wine products* are perceived to be more similar to *wine*. This finding is congruent with the results of the market simulation.

b) Individual level analysis

An analysis of the product evaluation at the individual level shows that only some consumers perceive the two product types under investigation to be different:

Wine Product compared to *Wine Based Beverage*:

- 56% perceive *wine products* and *wine based beverages* to be very similar
- 41% perceive *wine based beverages* to be at least two points less desirable than *wine*

The following chart shows that a large share of respondents (56%) perceive *wine products* and *wine based beverages* to be similar (bars close to x = 0), whereas some respondents (41%) prefer *a wine product* over a *wine based beverage* (bars to the right to x = 0).

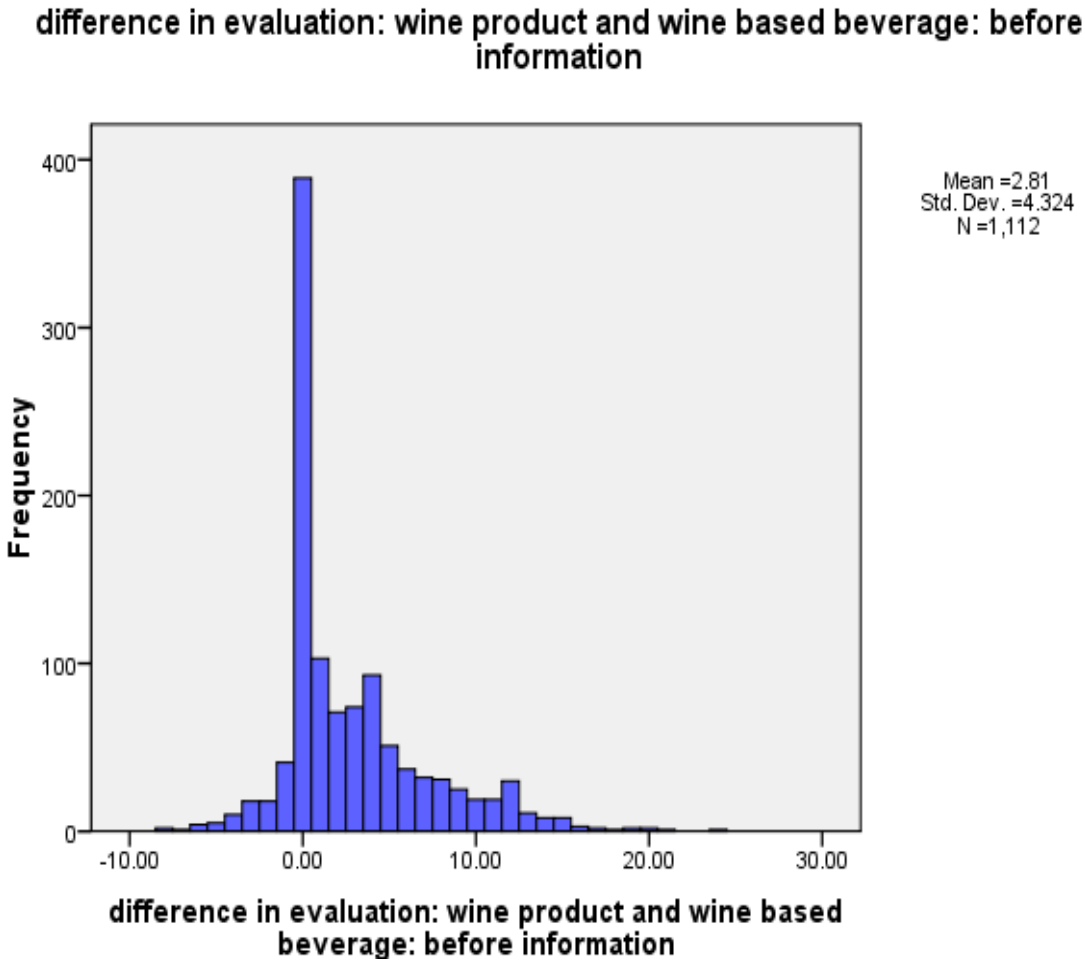
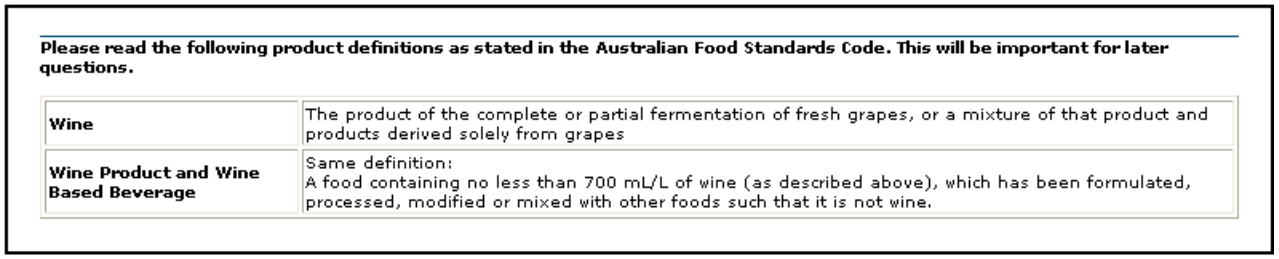


Figure 10 Difference in evaluation between wine product and wine based beverage (before information)

c) Impact of information on product evaluation:

After evaluating all three product types (*wine*, *wine product* and *wine based beverage*) with no information, respondents were then provided with definitions of the product types.



Please read the following product definitions as stated in the Australian Food Standards Code. This will be important for later questions.

Wine	The product of the complete or partial fermentation of fresh grapes, or a mixture of that product and products derived solely from grapes
Wine Product and Wine Based Beverage	Same definition: A food containing no less than 700 mL/L of wine (as described above), which has been formulated, processed, modified or mixed with other foods such that it is not wine.

Figure 11 Screen shot of respondent information of wine, wine product and wine based beverage

We then used their evaluation scores after receiving these product definitions to measure the impact of information on consumers' product evaluations for *wine products/wine based beverages*. Consumers' relative change in evaluation scores were compared by calculating the percent change in evaluation scores pre-information versus post-information (% change = post-information score minus pre-information score divided by pre-information score).

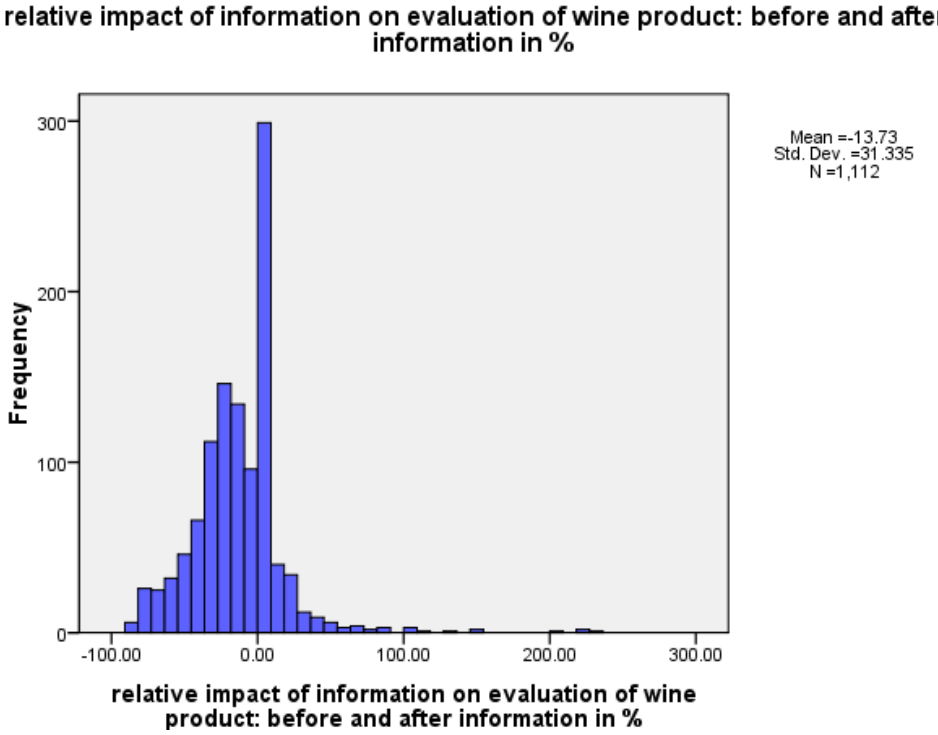


Figure 12 Relative impact of information on evaluation of wine product

For 38% of all respondents, the information had no or almost no impact on their evaluation of a *wine product* [-10% to +10% change]. For 52.3% of respondents, their perception/ evaluation of a *wine product* decreased by at least 10% of their evaluation. For the majority (32%) of the sample, this decrease in evaluation score was of medium size with up to 25% of their initial evaluation. For 12.7% of respondents, the information regarding the definition of a *wine product* had a strong impact, and their evaluation score decreased by at least 50%.

4) Consumers' perceptions of "allowed" production methods

Prior to being provided with the actual standard or FSANZ labelling code (see 3c above), consumers were asked to select which components they believed were allowed in the production of *wine*, *wine product* and *wine based beverage.*

Table 5 Question of consumer perception of allowed production methods

From your perspective, what do you think is allowed when producing the following three alcoholic beverages?
For each column, please tick all that apply.

	Wine	Wine Product	Wine based beverage
Labelling example if of Australian origin	***Wine of Australia***	***Wine Product of Australia***	***Wine based beverage. Product of Australia***
Is a product of fermented grapes.	☐	☐	☐
Mainly made from wine but other food components can be added	☐	☐	☐
Sugar can be added	☐	☐	☐
Water can be added	☐	☐	☐
Fruits juices other than wine can be added	☐	☐	☐
Aroma can be added	☐	☐	☐
Alcohol (eg. brandy or other spririts) can be added	☐	☐	☐
None of the above apply	○	○	○

The table shows the percent of consumers selecting each potential additive for each product type.

Table 6 Results of consumer perception of allowed production methods

Statements of allowance	**Wine**	**Wine Product**	**Wine based Beverage**
Is a product of fermented grapes	79.6%	50.4%	32.2%
Mainly made from wine, but other food components can be added	12.5%	52.4%	62.8%
Sugar can be added	21.5%	54.2%	67.7%
Water can be added	17.9%	52.8%	69.2%
Fruits juices other than wine can be added	12.0%	40.1%	72.5%
Aroma can be added	16.3%	49.4%	65.3%
Alcohol (e.g. brandy or other spirits) can be added	15.1%	45.2%	64.7%
None of the above apply	15.0%	13.3%	13.5%

It is interesting to note that although almost 80% of consumers thought *wine* was a product of fermented grapes, only 50.4% of consumers thought that *wine products* were made using fermented grapes. Furthermore, only 40.1% to 54.2% of consumers indicated they believed components (other than fermented grapes) such as sugar, water, fruit juices or alcohol could be added. Considering these results, it appears that roughly one-half of consumers currently do not know what can be included in a *wine product*.

When the term *wine based beverage* is used, the percent of consumers believing a specific component can be added increases significantly, with 10.4% to 32.4% more consumers believing the component can be added to products labelled as *wine based beverages* compared to *wine products*. Therefore, the use of the term *wine-based beverage* appears to better indicate to consumers that components other than fermented grapes may be included in the beverage.

5) Consumer approval of production methods

After respondents were informed about the allowed production methods (see 3c above), they stated their approval of production methods allowed for *wine products* and *wine based beverages*.

Table 7 Question of consumer approval of food additives to wine products/ wine based beverages

Please indicate how much you approve or disapprove the addition of the following components to a Wine Product or Wine based beverage?

	Level of Approval						
	Totally disapprove 1	2	3	Neither 4	5	6	Totally approve 7
Other food components can be added to grapes in general	○	○	○	○	○	○	○
Sugar can be added	○	○	○	○	○	○	○
Water can be added	○	○	○	○	○	○	○
Fruit, other than grapes, can be added	○	○	○	○	○	○	○
Aroma can be added	○	○	○	○	○	○	○
Alcohol (eg. brandy or other spirits) can be added	○	○	○	○	○	○	○

The following table shows the percent of consumers who disapproved, neither approved nor disapprove, and approved the addition of various food components to *wine products* and *wine based beverages*.

Table 8 Results of consumer approval of food additives to wine products/ wine based beverages

	Disapproval (1-3)	**Neither (4)**	**Approval (5-7)**
Other food components can be added to grapes	38.6%	35.2%	26.1%
Sugar can be added	41.1%	31.8%	27.0%
Water can be added	43.6%	30.5%	26.0%
Fruit, other than grapes, can be added	28.6%	31.7%	39.6%
Aroma can be added	42.2%	34.2%	23.6%
Alcohol (e.g. brandy or other spirits) can be added	31.2%	33.7%	35.1%

It is again obvious that consumers generally do not agree with each other in their perception of allowed production methods, this finding is consistent with the results from the market simulation and the direct product evaluation discussed above. Depending on the specific component, a share of about 30% to 40% does *not* approve the addition of other food components to *wine products*. The additions of water, sugar and aroma are most highly disapproved, considering all components.

Around one-third of consumers do not have a strong opinion and neither approve nor disapprove of the addition of any type of food components. Approximately one-quarter of consumers do not disapprove of the addition of other food components in the production of a *wine product* / *wine based beverage*.

Interestingly, over one-third of consumers approved the addition of fruit (other than grapes) and alcohol. This shows that there is still a market for some types of *wine based beverages* even after a change of labelling, when consumers can be assumed to have more complete information.

6) Overall consumer evaluation

In the final set of product labelling questions, we asked consumers directly if they felt mislead, and if they would purchase a wine product that may have other food products added.

The following table provides the percent of consumers agreeing, neither agreeing nor disagreeing, and agreeing with the three statements.

Table 9 Respondent responses to direct question of potential misleading

Statement	**Disagree (1-3)**	**Neither (4)**	**Agree (5-7)**	**Mean**
When I purchase a "Wine Product of Australia" I feel mislead if this product is not completely made of grapes but can contain other food	17.1	29.0	53.9	4.78
I would not purchase a "Wine Product of Australia" if I knew that other food components, such as water or sugar, can be added up to 30%.nts.	15.6	25.9	58.5	4.95
It does not matter to me if a "Wine Product of Australia" is not exclusively made of grapes as long as I like the taste of it and the quality is good.	38.2	29.8	32.1	3.71

Considering previous research insights, it is not surprising that consumers are more concerned when asked directly about potential misleading when presented with incomplete information. About 50% to 60% of consumers stated that they felt mislead or they would not purchase a *wine product* if they knew that other food components may be added. This share is higher and overstates real consumer concerns compared to the results discussed previously, which were obtained using more reliable, indirect methods.

The last question asked if consumers would purchase a *wine product* if other food components may be added, even if he/she liked the taste of it and if the quality was good. Interestingly, about 40% of consumers indicated they would still feel mislead and that they would have a different perception of the product even if it tasted good. Thus, even if *wine products /wine based beverages* are perceived to taste good and to be of good quality, consumers still feel misled if other food components are added. This proportion is similar to the 30% to 40% of respondents we found previously when measuring preferences through indirect product evaluations.

Comparing the results of the different approaches, we conclude that 30% to 40%of Australian cask wine consumers are potentially misled by the current product labelling of '*wine product*'.

Appendix

1) Experimental design

a. How many combinations were used – noting that each respondent made 16 choices?

The study applied a 4^4 x 2^2 orthogonal main effects plan (OMEP) with 64 alternatives (attribute combinations) in 16 choice sets of 4 options.

b. What (statistical?) criteria were used to determine the combinations of package elements in the final sets of stimuli used? (page 7).

The statistical design was derived according to the theory of optimal designs for stated choice experiments by Street and Burgees (2007). The design is statistically efficient at the level of 100%, implying that the design extracts as much information as possible from the experiment (Street and Burgess 2007, p. 84)

c. Query the number of levels for labelling in the table at the bottom of page 7.

The assignment of attribute levels for the labelling attribute took the relative market share of the products to be analysed into account to ensure that wine occurred more often than wine products and wine based beverages. For the four levels wine was chosen twice and wine product and wine based beverage once. A model estimating two part worth values for wine did not result in significant different estimates, thus warranting the wine can be treated as one attribute level in the models discussed later (Table 11 and Table 12).

2) DCE Analysis and results

d. Additional detail on the methodological and analytical techniques used. (A methodological appendix summarising the DCE approach including a brief discussion of its assumptions and limitations with reference to relevant literature could satisfy this)

The data from the choice experiment was analysed with two methodological approaches in Latent Gold 4.5 Syntax module (Vermunt and Magidson, 2008):

1) Multinominal logit model

The standard multinominal logit model is the most widely used discrete choice model (Train 2003, p. 38). It is based on Random Utility Theory

(1) $$U_i = \beta\, X_i + \varepsilon_i$$

where the utility from choosing an alternative i from the available choice options S is a linear combination of attribute part worth β and an error term . The Vector X_i consists of the choice-specific product attributes. Under the usual assumptions that the errors ε_{ni} are iid and follow a Type I distribution the probability that alternative i is chosen from all alternatives j equals:

(2) $$\pi\,(i) = e^{\lambda\,(\beta\, X_i)} / \sum_{j \in S} e^{\lambda\,(\beta\, X_j)}$$

Usually the scale parameter λ is assumed to be identical for all respondents and is set to 1.

The logit model has three major assumptions/limitations:

i) While systematic taste variation (that relates to observed characteristics, e.g. socio-demographics, behaviour, tastes and preferences of the decision maker) can be incorporated in the model, no random taste variation can be represented.
ii) The logit model implies proportional substitution across alternatives (independence of irrelevant alternatives IIA).
iii) Logit cannot handle situations where unobserved factors are correlated over time.

While iii) is relevant for panel data mainly and ii) the assumption of IIA has proven to be a adequate approximation to reality in most cases (Train, 2003), the assumption of preference homogeneity for alcoholic beverage purchase behaviour is very strong and will be relaxed in the next model.

Estimation results of the standard logit model are presented in Table 10.

2) Latent Class mixed logit model

While the standard multinominal logit model of discrete choice analysis assumes homogeneity of individual preferences (McFadden, 1974), this limitation was overcome with the introduction of random parameter logit (RPL) model approach (Train, 1998) and latent class (LC) models (Kamakura and Russell, 1989). Both approaches are related in sense that a LC finite mixture model converges to a RPL model for an endless number of classes (Greene and Hensher, 2003; Train 2003, p. 139). According to Provencher and Moore (2006), the choice between both methods should depend on what researchers believe about the underlying preference structure. If they are unique to individuals like a fingerprint then RPL is appropriate, drawing the part worth utility from a pre-specified distribution. If instead the spread of preferences is "lumpy" in a way that broad classes of consumers exist with similar preferences to each other, but different preferences to everyone else, then the LC approach is more appropriate (Hynes, Hanley and Scarpa, 2008). For food in general and wine specifically, the assumption that every consumer has individually unique preferences seems less adequate than the notion of a certain number of consumer groups with similar preferences.

To take preference heterogeneity into account in the analysis, a scale extended LC model was chosen to simultaneously approximate part worth utility parameters and class membership from the DCE choices. The model is based on the random utility framework, postulating a composite utility function of the following form:

(1) $$U_{ni/c} = \beta_c X_{in} + \varepsilon_{ni/c}$$

where the utility of the n^{th} respondent that belongs to a particular class s from choosing an alternative i from the available choice options S is a linear combination of attribute part worth β_c and an error term. The Vector $X_{ni/s}$ consists of the choice-specific product attributes. Preference heterogeneity is operationalised by estimating for each class c its own utility parameter vector β_c. Under the usual assumptions that the errors ε_{ni} are iid and follow a Type I distribution the probabilistic response function follows as:

(2) $$\pi_{n/c}(i) = e^{\lambda_c(\beta_c X_{in})} / \sum_{j \in S} e^{\lambda_c(\beta_c X_{jn})}$$

Usually the scale parameter λ is assumed to be identical for all respondents and is set to 1. But, individual or class-level parameters from choice models can only be estimated if scale parameter λ and model parameters β can be separated (Islam, Louviere and Burke 2007; Train 2003). Otherwise segmentation is highly likely to result in modelling different choice consistency (error variance) instead of true underlying preference differences (Magidson and Vermunt, 2007). A complete mathematical derivation of the LC choice model can be found in Boxall and Adamowicz, (2002), Louviere et al., (2000); Swait, (1994) and Train (2003) while the statistical estimation of scale extended LC model is detailed in Vermunt and Magidson, (2008).

We estimated the LC choice model with the syntax module of Latent Gold Choice 4.5 which allows us to estimate both β_c and λ_c simultaneously (Vermunt et al., 2008). For identification the scale parameter of one scale class is set to 1. Estimation results and attribute importance of the latent class model are presented in Table 12 and Table 13.

e. Details of the model used to estimate utility, and table of results

The multinominal logit model resulted in the following part worth estimates. The attribute importance is given in Table 3.

Table 10 Estimates for Multinominal Logit model (with price as a categorical variable)

Attributes	Coefficient	z-value	Wald	p-value
Alcohol			10.2	0.00
9.50%	-0.026	-3.186		
12.50%	0.026	3.186		
Sweetness			87.0	0.00
Dry White	-0.077	-9.330		
Sweet White	0.077	9.330		
Price			1405.0	0.00
$7.99	0.370	28.240		
$9.99	0.268	19.834		
$11.99	-0.220	-14.266		
$13.99	-0.418	-25.378		
Country of origin			3759.4	0.00
Australia	0.743	61.197		
Argentina	-0.249	-15.950		
Chile	-0.293	-18.534		
Spain	-0.201	-12.849		
Labelling			141.8	0.00
Wine	0.115	10.152		
Wine Product	0.032	2.425		
Wine based beverage	-0.147	-10.422		
Brand			1430.7	0.00
Sunnyvale	-0.306	-19.481		
Golden Oak	-0.345	-21.337		
Lindemans	0.287	21.133		
Yalumba	0.364	27.946		

(n=1,112, LL^2=29,769, df=1290, Pseudo R^2=0.123, all estimates are significant at p=0.05)

Details of conversion of estimations of utility into estimates of dollar values.

From the part worth estimates for the four price levels it appears that price has no completely linear impact, $9.99 seems to be a psychological price barrier after which there is the strongest drop in choice. Nevertheless the impact of price can be approximated with a linear relationship and was modelled as a continuous variable in the next model (see Table 11). The model fit parameters (LL^2 and Pseudo $R^{2)}$ signal that the model is only slightly inferior compared to modelling price as a categorical variable, indicating that a linear effect of price is a very good approximation.

The willingness to pay for each attribute was calculated by standardising the attribute part worth estimate by the price beta (-0.139) (Louviere et al. 2000). Accordingly, the relative difference in revealed willingness to pay between wine product and wine based beverage for the total sample results in a difference $1.23.

Table 11 Estimates for Multinominal Logit model (with price as a continuous variable)

Attributes	**Sample**	**z-value**	**Wald**	**p-value**	**WTP (β / β_{price})**
Alc			15.9	0.00	
9.50%	-0.032	-3.985			-$0.23
12.50%	0.032	3.985			$0.23
Sweet			105.2	0.00	
Dry White	-0.084	-10.255			-$0.60
Sweet White	0.084	10.255			$0.60
Country of Origin			3716.5	0.00	
Australia	0.735	60.831			$5.30
Argentina	-0.234	-15.190			-$1.68
Chile	-0.285	-18.117			-$2.05
Spain	-0.217	-13.882			-$1.56
Labelling			138.7	0.00	
Wine	0.112	9.993			$0.81
Wine Product	0.030	2.320			$0.21
Wine based beverage	-0.142	-10.300			-$1.02
Brand			1438.5	0.00	
Sunnyvale	-0.299	-19.129			-$2.16
Golden Oak	-0.347	-21.574			-$2.50
Lindemans	0.283	20.904			$2.04
Yalumba	0.363	28.100			$2.61
P continuous	**-0.139**	-36.589	1338.7	0.00	

(n=1,112, LL^2=29,874, df=1290, Pseudo R^2=0.121, all estimates are significant at p=0.05)

Table 12 Estimates for Latent Class Model (LL^2=19,069, df=1217, Classification error =0.029, Pseudo R^2=0.489, **p=0.05, *p=0.10)

Class	C1		C2		C3		C4		C5		C6		C7			
Class size	141		91		127		170		301		282		191	n=1303		
	11%		7%		10%		13%		23%		22%		15%			
	coef	zvalue	coef	zvalue	coef	zvalue	coef	zvalue	coef	zvalue	coef	zvalue	coef	Wald	df	p
Alcohol														36.0	6	0.00
9.5% vol	0.07 **	2.23	-0.01	-0.13	-0.18 **	-6.64	0.00	0.21	-0.01	-0.62	-0.03	-1.13	.			
12.5% vol	-0.07 **	-2.23	0.01	0.13	0.18 **	6.64	0.00	-0.21	0.01	0.62	0.03	1.13	.			
Sweetness														1534.5	6	0.00
Dry white	0.07 *	1.70	-0.13 **	-2.56	0.09 **	3.25	1.68 **	27.88	-1.58 **	-35.60	0.07 **	2.26	.			
Sweet white	-0.07 *	-1.70	0.13 **	2.56	-0.09 **	-3.25	-1.68 **	-27.88	1.58 **	35.60	-0.07 **	-2.26	.			
Price														749.0	18	0.00
$7.99	0.35 **	5.97	0.10	1.29	1.41 **	25.28	0.03	0.46	0.28 **	5.93	0.19 **	3.80	.			
$9.99	0.41 **	5.94	0.26 **	3.40	0.83 **	14.99	0.27 **	4.48	0.40 **	7.86	0.09 *	1.69	.			
$11.99	-0.10	-1.43	0.17 **	2.11	-0.31 **	-4.15	-0.25 **	-4.20	-0.23 **	-4.55	-0.01	-0.14	.			
$13.99	-0.66 **	-8.76	-0.53 **	-5.68	-1.93 **	-14.33	-0.05	-0.80	-0.45 **	-7.17	-0.27 **	-4.95	.			
Country o. origin														1619.2	18	0.00
Australia	0.16 **	2.97	0.10	1.17	0.22 **	4.80	0.29 **	4.50	0.37 **	7.02	1.97 **	49.15	.			
Argentina	-0.10	-1.54	-0.14 *	-1.70	-0.08 **	-2.32	-0.25 **	-4.00	-0.20 **	-3.73	-0.60 **	-9.54	.			
Chile	-0.06	-0.96	0.03	0.36	-0.05	-1.07	0.11 *	1.67	0.00	-0.02	-0.91 **	-12.72	.			
Spain	0.00	0.00	0.01	0.14	-0.09 **	-2.17	-0.15 **	-2.36	-0.18 **	-3.38	-0.45 **	-7.38	.			
Labelling														34.4	12	0.00
Wine	0.03	0.60	0.08	1.27	0.07	1.61	0.02	1.24	0.06 *	1.66	0.14 **	3.15	.			
Wine Product	-0.08	-1.23	-0.14 *	-1.77	-0.03	-0.84	0.04 *	1.80	0.04	0.91	0.08 *	1.85	.			
Wine Based Bev.	0.05	1.13	0.06	0.73	-0.04	-1.41	-0.06 **	-2.11	-0.09 **	-2.21	-0.22 **	-4.07	.			
Brand														1385.1	18	0.00
Sunnyvale	-1.23 **	-10.66	-1.15 **	-9.36	-0.07	-1.61	-0.17 **	-5.06	-0.19 **	-4.62	-0.38 **	-6.34	.			
Golden Oak	-1.33 **	-11.23	-0.45 **	-4.59	-0.03	-0.58	-0.14 **	-4.39	0.03	0.78	-0.22 **	-4.05	.			
Lindemans	0.78 **	12.13	1.85 **	28.47	0.08 *	1.85	0.16 **	4.78	0.21 **	5.18	0.30 **	6.02	.			
Yalumba	1.78 **	28.56	-0.24 **	-2.72	0.02	0.44	0.15 **	4.75	-0.05	-1.39	0.30 **	6.20	.			
R2	62.7%		65.6%		41.6%		36.6%		51.8%		72.6%					

Estimation results of the latent class model are detailed in Table 12. How does relaxing the assumption of homogeneity affect the part worth estimates of product labelling? For the standard multinominal logit model (Table 10) wine had a positive part worth, the part value of wine product was close to zero while wine based beverage was evaluated negatively over the whole sample.

When modelling heterogeneity product labelling has significant part worth estimates for four out of six classes, for three classes (58% of sample) wine based product is evaluated significantly negative, while wine product is non-significant (zero) or significant positive. It can be concluded that the majority of the sample evaluate wine based beverages to be significantly more negative compared to wine products. Thus, modelling heterogeneity confirmed the results from the aggregated multinominal logit analysis. Overall the importance of labelling slightly increased compared to the multinominal logit model (Table 3), but still remains relatively small in absolute terms and is the second least important (alcohol percent is the least important) attribute for cask wine choice.

Table 13 Attribute importance for Latent Class Solution

	C1	C2	C3	C4	C5	C6	Weighted Average
n	141	91	127	170	301	282	
Sweetness	5%	9%	9%	64%	64%	5%	30.6%
Country of origin	7%	5%	10%	10%	10%	64%	22.6%
Brand	57%	65%	5%	11%	9%	13%	20.5%
Price	21%	16%	54%	10%	13%	9%	17.6%
Labelling	3%	5%	4%	4%	3%	7%	4.8%
Alcohol	6%	0%	18%	0%	1%	2%	3.9%

From the price part worth estimates in Table 12 it can be seen that there is a strong non-linearity in price for many classes, such as class 1, class2, class 4 and class 5 which most highly value the medium price level $9.99. Estimating a latent class model with a linear price vector deteriorates the model fit substantially and produces a strongly biased price coefficient for these non-linear classes. Valid price estimates are therefore not possible for the latent class model.

A more detailed discussion of the six segments and their characterisation can be found in Mueller and Umberger (2009).

f. Further information on the 'random responses' and the logic of their exclusion from the analysis (page 4).

Simply put, 'random respondents' are respondents who did not reveal consistent product preferences in the experiment or were not taking the choice exercise seriously – this may occur for a variety of reasons (e.g. weak existing preferences, fatigue, lack of understanding of the product, personality etc.). Based on previous research the potential existence of this class of respondents is known prior to determining the desired sample size; and thus we obtain a larger sample than is statistically necessary to account for the probable existence of this 'random class'.

Latent Class modelling allows to specify and to test the existence of a 'random class'. Respondents with a 'random-like' choice behaviour are assigned a high likelihood to belong to the random class (Vermunt and Magidson, 2008). Previous applications such as Popper et al. (2004) have shown that

random responses can have a strong biasing effect, especially for biasing the values/importance of attributes with an overall small importance. If a respondent almost randomly chooses wines characterised by six attributes this results in an average importance of 16.6% for each attribute. Already a small share of random responses can inflate the importance of attributes which are rather unimportant to consumers. Eliminating random responses from the sample therefore ensures a higher validity of the estimates.

For this sample 191 respondents or 15% were assigned the median likelihood to belong to the random class. The size of the random class is consistent with previous findings by Remaud, Mueller, Chvyl and Lockshin (2008) and Remaud and Mueller (2008). This class is reported as class 7 for the latent class results in Table 12. Once random respondents were identified they were also deleted for the estimation of the standard multinominal logit model (results presented in Table 11).

3) Attitude questions

g. What was the basis and approach for the additive scale on page 13? Were inter-item correlations or alpha reliability calculated? What were the results?

The reliability of all scales was ensured with factor analysis (all items loading on one factor), inter item correlation (minimum of 0.5) and tested with Cronbach's Alpha. Based on these tests the item 'is an adulterated product' was excluded from the product evaluation scale because it loaded on a separate factor and had a low correlation with the other scale items. This resulted in a four items scale of product evaluation (Table 4).

Table 14 Scale reliability

Scale (4 items each)	**Cronbach's Alpha**
Wine evaluation – before information	0.881
Wine product evaluation – before information	0.920
Wine based beverage evaluation – before information	0.946
Wine evaluation – after information	0.915
Wine product/ wine based beverage evaluation – after information	0.916

h. What tests did you use to assess significance in the additive scales? What were the results?

Paired samples t-tests (paired means t-tests) were conducted using SPSS 17. The mean level of agreement for each statement regarding Wine, Wine Products and Wine Based Beverages both before and after "information" are shown in Table 15 on page 28. Means which carry the same superscript are not statistically different.

To determine if consumers were being mislead we compared consumers mean level of agreement with statements regarding Wine, Wine Products (WPs) and Wine Based Beverages (WBB) before and after information (means for WPs in second row versus means for WPs/WBBs in last row, and means for WBB in third row versus means for WPs/WBBs in the last row of Table 15).

- Consumers' perceptions of WPs significantly *decreased* after receiving information on the definition/standard for WPs.
    - After receiving information about the actual product definition, consumers' average evaluation scores for WPs after information (last column, second and last row of Table 15) were significantly lower than evaluation scores for WPs/WBBs.
    - Consumers' agreement with statements that WPs are high quality, taste good, and are natural products, significantly decreased after information was provided.
    - Consumers' mean level of agreement with the statement that WPs are "something I would consider purchasing" also significantly decreased after information.
    - Consumers' mean level of agreement with the statement that WPs are "an adulterated product" was not significantly different after information.

- Although small, consumers' average evaluation of WBBs also significantly *decreased* after receiving information on the definition/standard for WBBs (last column, third and last rows of Table 15).
    - Consumers' mean agreement with statements that WBBs are high quality, taste good and adulterated were not significantly different after information was provided, however, consumers' mean agreement with the statement that WBBs are "a natural product" was significantly lower after information was provided.
    - Consumers' mean level of agreement with the statement that WBBs are "something I would consider purchasing" also significantly decreased after information.

i. Succinct discussion based on the research addressing the 2 questions of: Are consumers are mislead by the term 'wine product'? and Will the term wine-based beverage reduce this?

Considering the representative sample, it does appear that consumers are being misled by the current labelling of Wine Based Beverages as Wine Products. The use of the term Wine Based Beverage appears to better indicate to consumers that components other than fermented grapes may be added or used in producing the beverage. Our conclusions are based on the results shown in table 6 (page 17), which summarises consumers' responses to the following question: "From your perspective, what do you think is allowed when producing the following three alcoholic beverages." This question was asked of consumers before they were provided with the Australian Food Standards Code product information (see Figure 11). Before information (current market/labelling scenario) when the term Wine Based Beverage was used (versus the term Wine Product), a larger share of consumers (10% to 30% more) could properly identify what components could be used in the production of the wine products/ wine based beverages.

The results summarised in Table 9 on Page 19 provide further support for the conclusion that consumers are mislead when the current labelling wording is used. Over one-half (53.9%) of consumers agreed that they would feel mislead if a "Wine Product of Australia" was not made completely of grapes, but could contain other food. Nearly 60% (58.5%) of consumers agreed that they would not purchase a "Wine Product of Australia" if they knew that other food components, such as water or sugar, could be added. Finally, only 32.1% of consumers agreed with the statement that "It does not matter to me if a "Wine Product of Australia" is not exclusively made of grapes as long as I like that taste of it and the quality is good."

The pre-information versus post-information results shown in table 15 also somewhat supports the conclusion that some (approximately 40%) consumers are being mislead by the use of the term Wine Product for Wine Based Beverages. Consumers' perceptions of Wine Products in terms of quality, taste, naturalness and intent to purchase were all significantly higher pre-information than post-information. When consumers were provided with information about the Australian Food Standards Code "definition" of a Wine Product, their perceptions of the Wine Product more closely matched the pre-information rating for Wine Based Beverage. Wine Based Beverage appears to be less misleading for most consumers –particularly when used in conjunction with country of origin.

j. How generalisable are the findings to New Zealand consumers?

This study did not include NZ wine consumers and cannot conclude exactly how strongly NZ wine consumers might be affected by the product labelling. Existing studies on New Zealand wine consumers (Thomas, 2000; Thomas and Pickering, 2005) have revealed strong similarities to the wine behaviour of Australian consumers. An international study by Goodman, Lockshin and Cohen (2007a, 2007b) comparing drivers of retail wine choice between eleven countries revealed that Australia and NZ had the strongest similarities of all countries analysed. According to these results Australian and NZ wine consumers are driven by very similar product attributes and purchase criteria when choosing a wine in a retail setting.

These proven strong similarities of wine consumers from both countries let us assume that these findings are also generalisable to NZ consumers.

Table 15. Consumers' mean level of agreement with statements regarding Wine, Wine Products (WP) and Wine-Based Beverages (WBB), before and after product information.

	Is of high quality		Tastes Good		Is a Natural Product		Is an adulterated product		Is something I would consider purchasing		Average Evaluation	
Before Information	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Wine	5.17	1.15	5.15	1.12	4.75	1.13	4.04	1.28	5.50	1.12	20.58	3.87
WP	4.71	1.31	4.77	1.23	4.41	1.23	4.18[a, b]	1.27	4.81	1.35	18.70	4.61
WBB	3.97[d]	1.46	4.14[e]	1.35	3.82	1.40	4.18[a, c]	1.43	3.95	1.54	15.89	5.34
After Information	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Wine	5.28	1.18	5.22	1.16	5.21	1.19	3.94	1.65	5.44	1.19	21.15	4.19
WP /WBB	3.98[d]	1.38	4.12[e]	1.28	3.61	1.42	4.18 [b, c]	1.55	3.79	1.49	15.50	4.95

[a,b,c] Means with the same superscript are not statistically different ($\alpha = 0.05$)

4) Copy of the survey used

Please see the separate pdf file "Survey_WFA 2008 October Study_screenshots.pdf".

This file contains screenshots of the final online survey instrument. Please note that all consumers/respondents were presented with 16 different wine shelves and were asked to choose one product for purchase from each one – in the attached copy of the survey we have shown screen shots of only 2 of the 16 wine shelves (graphics of all 16 are available upon request).

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