From product to purpose: creating value from flavour glycosides

In a purely scientific process, the endeavour of research is to understand how or why something happens and what mechanisms can be used to influence it. One example is the research outcome that certain components extracted from grape marc can be added to wine to increase 'fruity' or 'floral' characters. The extracted compounds that are large and lack aroma break down and release smaller, aromatic molecules in a process that depends largely on the pH of the wine. In short, winemaking by-products (grape marc) can form the basis of flavour enhancers, where the speed of release can be controlled with wine pH.

Figure 1. Schematic showing the potential for extracts of grape marc to contribute flavourings to wine

Ideally, outside that scientific endeavour there are people (in this case within the wine sector) who can use that information to make their lives better, whether by making an existing process quicker, cheaper or even redundant, or by allowing them to do something they didn't know was possible. At some point, the scientific outcome needs to overlap meaningfully with a real-world process, so that the benefit of adopting it offsets the effort of managing the change from the *status quo*. Using the example above, this would mean understanding how flavour enhancement could be used in the wine sector, and why someone would take extra steps to incorporate it into their business.

Recently, a joint AWRI-Wine Australia team took part in a CSIRO-run program to explore potential market opportunities for marc-derived flavour enhancement through a process of customer engagement and discovery. This article describes some of the findings from this program to highlight the concepts learnt.

The program

The CSIRO *ON Prime* program is targeted at a pre-commercialisation stage of research and teaches participants to understand where their scientific discovery or product fits for potential end-users or purchasers. It uses several tools to re-orient thinking away from a solution focus (a solution looking for a problem) and towards the potential end-user and which aspects of their business would provide incentive to employ the potential solution. To do this, a potential end-user group is hypothesised, which can be as broad as 'grapegrower' or as specific as 'new product developer at large wine company'. An assumed understanding of the end-user's role is mapped, including the parts of their job with inherent inefficiencies, ('pains'), as well as their ultimate outcomes in each task ('gains'). Ideally, the scientific solution can be linked with providing or increasing an assumed 'gain' and/or reducing or removing a 'pain' in the end-user's business, which would go hand-in-hand with the incentive for embracing the solution.

Regardless of how much confidence there is in the understanding of an end-user group's potential application, the assumptions made about their role, pains and gains must be tested via consultation with a number of people in that group. This is ideally done without talking about the possible solution directly, to avoid creating confirmation bias. The consultation process is generally approached using open questions that do not reference the discovery or 'lead' the interviewee. In the case of marc-derived flavour extracts, initial questions explored the logistics of creating extracts in a winery when marc is produced and how accepting winemakers were of using flavour additives.

Table 1. Initial assumptions generated during *ON Prime* about the 'wine producers' end-user group, along with the outcome of the assumption testing conducted via numerous conversations with members of the group

Assumption	Testing outcome
Wine producers are too busy during vintage for any additional jobs	Confirmed
Additives are valuable for achieving wine style targets	Confirmed
Winemakers are averse to using flavour additives	Invalidated
Grape marc has very little value to all wineries	Confirmed
Winemakers want more or different flavour	Dependent on producer and/or target style
There are regulatory barriers to using grape extracts in Australian wine production	Invalidated

Wine sector outcomes

In conversations with the rather broad 'wine producer' group it became clear very quickly that although the extraction and purification of marc extracts was designed to be achieved in a winery setting, there was no interest from winemakers in performing this additional task. Immediately this suggested that the process of extract production should instead be performed on an aggregated marc feedstock at a centralised location, rather than in-house at a winery. It was also obvious that regardless of the size or type of winery the use of additives was acceptable and common, even if simply for 'finishing' wines. Most wine producers had no significant aversion to using additives.

The 'wine producer' end-user group was then broken down into segments to obtain further clarity on the information that was being gathered. This could be done by size, distribution channels, relationship to the grapes (e.g. own vineyard or purchased grapes), philosophy or combinations of these. For example, when it came to the question of modulating wine flavour to meet a certain style, there was one segment that was more likely to wish to let the wine reflect the vineyard and the given vintage conditions. For members of this segment, making wine with vintage-to-vintage consistency was not a goal, and as such they were not compelled to use flavour enhancement simply to meet stylistic targets. However, even within this segment there were comments regarding the influence of distribution avenues, with wineries selling through a distributor needing to be more consistent with a promised style, while those with direct-to-customer sales avenues appreciated being able to tell the story of the vintage through the wine.

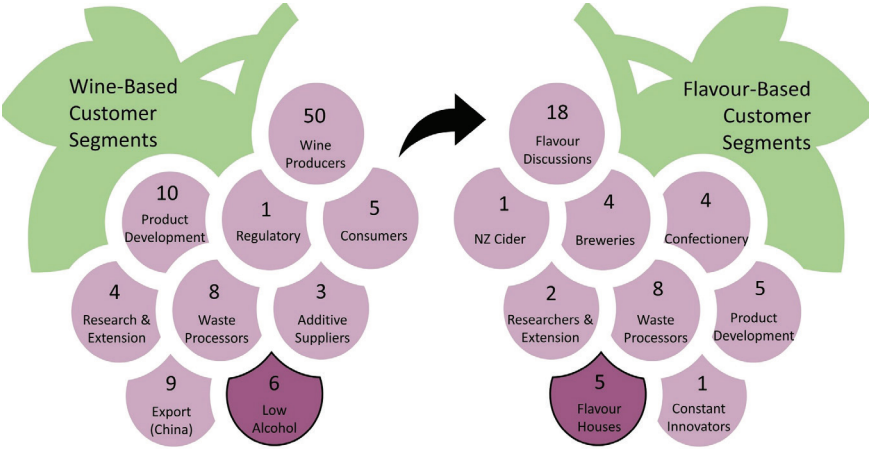

Figure 2. Customer groups from inside and outside the wine sector and the number of conversations undertaken. Darker shading indicates the segments where most promise was observed

The producers that were more likely to desire flavour modulation to meet stylistic targets were large, commercial wine companies. The product segment likely to gain the most from flavour modulation was the small but rapidly growing category of low and no-alcohol wine products. However, when it came to modulating flavour in commercial wine production, producers expressed very strict upper limits on additive costs. While the extraction of grape marc and purification of the liquid extract was simple and imposed a relatively low additional cost, the energy-intensive concentration of the extract meant that the cost of production exceeded that upper limit by a significant amount.

Options outside the wine sector

During the program, potential end-users in outside the wine sector were also examined, and this work indicated there was scope to re-direct marc extracts into flavouring components in other sectors with higher acceptable input costs. Specifically, industries that expressed an interest in naturally derived flavour additives were targeted, although this was technologically constrained by the need for acidic conditions to allow the flavour to be produced. As such, marc-derived extracts would be immediately more applicable to acidic beverages. Further research would be required for use in non-acidic products where flavour would not be automatically released.

Overcoming identified barriers

Within the wine sector, the barrier imposed by the current cost of production of these flavour extracts needs to be addressed for them to be used in commercial wine production. This could be achieved either via investigating more energy efficient technologies for drying or concentrating, or by combining the production with that of other useful components from grape marc, which would ultimately dilute the costs of production by creating multiple product streams.

Conclusions

Taking part in the *ON prime* program and applying its techniques to understand the end-users of research outcomes has been highly beneficial for the AWRI/Wine Australia team. Specifically, within the project that was explored, the application of flavour extracts to no- and low-alcohol products has become a focus of future work. Generally, the new perspectives gained from making and testing assumptions will be relevant and valuable in the planning and conduct of future research projects, and will hopefully smooth the transition of research outcomes to practice change.

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