

Objective Measures of Quality

The *GWRDC Strategic RD&E Plan 2012–17* identifies the development and adoption of objective measures of quality as a priority for the Australian wine sector.

Discussion paper

Background

Enhancing the value proposition for consumers requires a new and updated set of tools and evolution of practices by the wine sector. This forms the basis of the *GWRDC Strategic Research, Development and Extension Plan 2012 –17* Program 3: Improving Products and Processes.

In the vineyard, developing and establishing novel and improved objective measures of grape quality will help elucidate the relationship between vine yield and grape attributes that relate to wine qualities consumers value, and identify practices that achieve vine balance with optimal fruit quality and yield. In the winery, such measures will lead to the development of new and improved winemaking practices, packaging and transport strategies. This will ultimately be driven by consumer demands coupled with a greater understanding of the drivers of wine quality. Product innovation that unlocks new demand or taps unrealised value will improve productivity and profitability.

‘Objective measures of quality and assessment systems’ is a sub-program of Program 3. Being able to objectively define and measure grape and wine quality, beyond the basic parameters of sugar, acid and colour, is essential to being able to manage and improve products and processes in a timely manner. Significant efforts in the past have shown that defining and measuring quality is not a simple exercise and suggest that focusing on selected key measurable attributes and developing a matrix approach to assessment is more likely to be successful than attempting to broadly define ‘quality’ in a single measurement.

Providing the sector with production methods and tools to grow grapes and produce wine of known and desirable composition is a core objective of this sub-program. The strategies to achieve this include:

- Understanding the genetic, chemical and biochemical basis for wine quality attributes related to consumer preferences for colour, aroma, taste and texture.
- Specifying and developing broadly relevant and objective measures of grape and wine quality, including attributes that are desirable and undesirable to consumers.
- Identifying viticultural and winemaking practices that produce fruit and wine with desirable characteristics.

Situation analysis

GWRDC commissioned Mark Gishen, Gishen Consulting, to review current knowledge in this area, to identify practices that are currently being employed within the wine sector and to identify industry needs. The paper is attached and a summary is provided below.

Objective measures of quality – a briefing paper

M. Gishen

Defining the quality of grapes and wine using objective measures has proved to be problematic. There are several reasons for this, including the changing preferences of buyers and consumers, the difficulty in identifying the characteristics that are 'valued' by the buyer, and because of the complexity of the product and process transformations that accumulate and interact to affect the final outcome. Even the use of the word 'quality' in this context can be interpreted in several ways, although the degree to which grapes and wine fulfil their purpose or intended style appears to be the definition most favoured by the wine sector.

For many years, the sector has used some objective (and subjective) measurements to value and specify products in the supply chain. In some cases, such specifications have been used to set purchase prices as part of supply contracts and in other cases for product 'streaming' to assist with process planning and logistics. Nevertheless, there remains a range of views on the value proposition of using objective measures of quality or to determine 'fitness to purpose'.

In the past, quality measures have been limited to in-vineyard visual assessments coupled with basic compositional measurements such as Baume, pH and titratable acidity. Over the past 20 years, colour in red grapes has been deployed by some wine companies as a quality measure and at least one company attributes increased red wine quality over this time period to using this measure of quality. This demonstrates the value in the principle of using 'quality' measures to incentivise and provide feedback to grape suppliers regarding the product specifications required.

Current situation

Many wineries are currently satisfied with the quality measures they are using and there is insufficient value proposition for them to change at present. The adoption of red grape colour as an objective measure of quality stands out as having been particularly successful in raising the standard of quality in some specific wine types in certain regions, but it is by no means a universal practice.

There are a large number of measurements that have been developed and examined as potential application as quality measures. Some of these include:

- Vineyard measures – quantitative assessments including yield, bunch size, bunch number, bunch weight, leaf area, sugar, anthocyanins (colour), acid, fungal contamination, physical damage; and qualitative assessments such as vigour, vine balance, and grape flavour.
- Weighbridge and winery measurements – quantitative determinations such as sugar, acid, anthocyanins, matter other than grapes (MOG), glycosyl-glucose, methoxypyrazines, tannin, yeast assimilable nitrogen; and qualitative assessments such as organoleptic characteristics (mouthfeel, flavour, balance).

Some of the measurements can be considered as imparting negative attributes (e.g. bunch rots, MOG) and some positive (e.g. flavour), although for many of these there may well be an optimum level for a given product style with both very low or very high levels causing diminution of 'quality'.

Despite an apparently large investment in research on objective measures of quality by the wine sector over time (i.e. through GWRDC and the CRC for Viticulture), the sector has not adopted all of the considerable knowledge developed by Australian researchers. The challenge now is how to interpret and use that knowledge to drive innovation.

Needs, gaps and opportunities

It is clear that research may not be able to provide a solution to all problems related to the application of objective measures of quality, however, there are some key researchable questions that could potentially lead to the development of industry practical and relevant solutions.

For any measure of quality to be of value to sector, it will need to have the following characteristics:

- Meaningful – to the supplier and buyer; the data must convey 'how does this number taste?' and relate to wine value, together with a clear understanding of what processes can be changed to impact it.
- Simple – the measurements must be easy to carry out and user friendly.
- Affordable – inexpensive to conduct the measurements and without high sampling costs.
- Robust – the measurements must be precise, accurate, and reproducible.
- Flexible – the measurements must be adaptable to changes in market demands.

Future efforts must remain focussed on addressing the major barriers that have been identified from past experience. These include:

- Research outputs must have a clear value proposition for industry. The economic aspects of the value of measures of quality should be given higher consideration when developing research proposals.
- Researchers' activities must be informed and guided by the needs of industry. There is a need to understand the motives of the buyer to determine what it is that the buyer values, and if it can be measured.
- Proposed objective measures of quality must be relevant to industry and practical to use.

There is a strong desire for the sector to continue research for new knowledge, notably in flavour and especially for white wines. There is also a view that there is a need to reinvigorate a collaborative approach involving researchers and grape and wine businesses to focus directly on the issue of objective measures of quality.

A priority should be for researchers to work on finding ways to use the current knowledge before seeking to find new measurements or concepts. There is evidence to suggest that a combination of the simple and well-understood existing compositional measures may provide a practical solution to at least a broadly indicative level. It is important to note that other industries in Australia, such as coffee, are not necessarily any further advanced, except in cases where the product is sufficiently simple, such as wheat, and the characteristic of value to the buyer is well understood (which is not the case for wine). Interestingly, international competitor wine companies have been able to interpret research outcomes from Australia and develop successful multi-parametric models to predict wine quality for their businesses. A multivariate approach using most or all currently known potential measures of quality is worthy of further investigation by researchers on a larger scale and in collaboration with the Australian wine sector.

There are some specific opportunities for research that should assist in developing objective measures of quality that will be valuable for the sector, including:

- Variability of ripeness – considered to be a key factor influencing quality.
- Surrogate for organoleptic assessment of grapes – a more reproducible and cost effective test could add value and reduce costs to businesses.
- Flavour – especially for white grapes/wine.
- Grape soundness/rots – emerging technology may provide the required attributes identified for objective measures of quality.
- Understanding the impacts of quality and yield relationship in vineyards – considered to be worthy of further investigation.

Aim of the workshop

GWRDC's stakeholders have identified objective measures of quality as a high-priority area for future investment. This workshop will help inform these investment decisions.

The workshop will bring industry and researchers together to discuss where the gaps are in our current knowledge, what would help fill those gaps, and how researchers might collaborate and build on the work already undertaken by the sector to deliver information that can be applied to support innovation.

Discussion questions

1. What is the value proposition for using quality measures?
2. What are or would be the characteristics of successful measures of quality?
3. How can we make better use of existing knowledge of quality measures?
4. What barriers exist to developing objective measures of quality that will be valued?
5. What is the best way to develop measures that reach across the value chain?
6. What other information do we need on consumer preferences for wine flavours, styles and attributes? Do we know how much consumers value flavour?
7. What new objective measures of quality are likely to be of value?
8. What are the researchable questions that might lead to valuable objective measures of quality?

Resources

1. Gishen, M. (2012) Objective measures of quality – a briefing paper. GWRDC project GWR1107 (attached)
2. Krstic, M., Moulds, G., Panagiotopoulos, B. and West, S. (2003). Growing Quality Grapes to Winery Specifications. Edited by S. Collings, Winetitles, Adelaide, South Australia.
3. Allan, W. (2003). Winegrape Assessment in the Vineyard and at the Winery. Winetitles, Adelaide, South Australia. (download at http://www.wfa.org.au/files/resources/Winegrape_Assessment.pdf)
4. Francis, L., Høj, P., Dambergs, R., Gishen, M., de Barros Lopes, M., Pretorius, I., Godden, P., Henschke, P., Herderich, M., Waters, E. (2005) Objective measures of grape quality - are they achievable? 12th Australian Industry Technical Conference, 4-7 August 2004, Melbourne, Australia, 85-89 (request at http://www.awri.com.au/information_services/publications/ as article ID S843)