Project Summary
Valuing the Environment in Viticulture

A Food Agility CRC project

Linking financial and environmental benchmarking to improve decision-making in the Australian wine industry

foodagility | The Australian Wine Research Institute | nab | QUT

Linking financial and environmental benchmarking to improve decision-making in the wine industry

In a first for Australian agriculture, Food Agility CRC's Valuing the Environment in Viticulture project, in partnership with NAB, AWRI and QUT, linked environmental benchmarking data to financial information and developed a sustainability indicator (Resource Intensity Score) for the wine sector. The wine sector already has the most in-depth and long-term environmental dataset in Australian agriculture thanks to high participation in the Sustainable Winegrowing Australia program. The program has been collecting data since 2009 and membership now comprises ~500 growers, covering ~25% of Australia's winegrape vineyard area and ~25% of the Australian winegrape crush. The project took advantage of this dataset and collected additional financial information from growers to test the hypothesis that environmental information can enhance financial decision-making. In addition to providing direct benefits to winegrape growers, we hope that this work will inspire other sectors to take a similar approach.

PROJECT HIGHLIGHTS

1. Industry benchmarking and a pilot sustainability indicator (Resource Intensity Score) were developed based on production data shared by 393 winegrape growers. This RIS sustainability indicator is a first for the Australian wine sector and may serve as a leading example for other sectors.
2. A comparison of the RIS and financial data shared by 67 of these growers showed that the most profitable vineyards (top 10% by gross margin) tended to be more resource-use efficient, as indicated by a lower RIS. To produce one tonne of grapes, top 10% vineyards used only 53% of the water and 41% of the energy and emitted 37% of the carbon dioxide that bottom 10% vineyards did (based on median values). This linking of economic and sustainability benchmarking data is also a first for Australian agriculture.
3. Benchmarking using the Sustainable Winegrowing Australia reports has helped growers identify areas for more efficient resource use, which may also lead to financial benefits. Membership numbers continue to grow, demonstrating the value of the program.

Water + energy + CO_2 per tonne of grapes

Resource Intensity Score (RIS)

Lower RIS
Higher gross margin
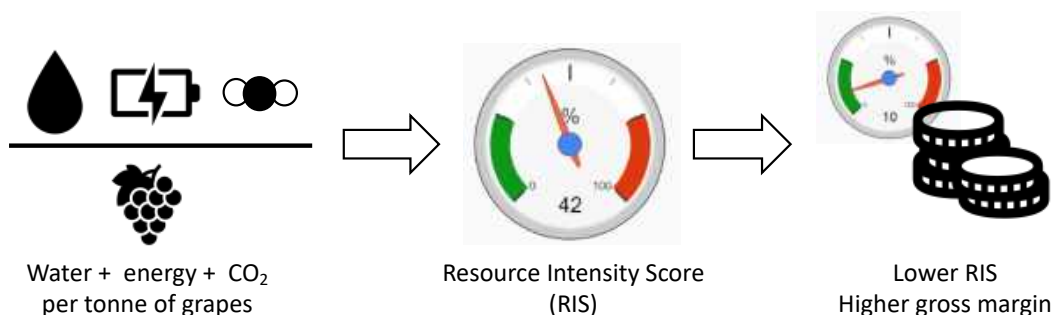
"Sustainable Winegrowing Australia is a platform for reporting the records that we already keep. Crunching the numbers provides an opportunity to get a good grasp on how well the business is performing. From a wine business perspective, reporting sustainability credentials is becoming a standard process to enter the international wine market and Sustainable Winegrowing Australia validates our sustainability performance."

Steve Fiebiger, Viticulturist, Thorn Clarke Vineyards, Barossa

Next steps will focus on increasing the quantity and quality of the data to improve the RIS sustainability indicator and profitability/sustainability model for the benefit of individual growers, the wine industry and financial institutions. This will include continuing to collect data over time and from a broad range of winegrape growers, with an emphasis on increasing the number of vineyards who provide gross margin and other financial benchmarking data.

Through this program/research, we hope that growers will be better able to understand and communicate the decisions that they are making, identify opportunities for improvement, and demonstrate to banks that their businesses are financially and environmentally sustainable and resilient over time.

BACKGROUND

Sustainability is a growing industry concern

There is growing recognition that the economic sustainability of winegrowing, and agriculture in general, depends on good environmental and resource management. Consumers, retailers and restaurants in Australia and around the world are also interested in wines that meet modern sustainability standards and may pay a premium for these products[1,2]. In light of these trends, the Sustainable Winegrowing Australia program was developed for members to demonstrate, substantiate and communicate their commitment to sustainability and continuous improvement.

At the outset of this project, the AWRI-led program had 500 members representing ~25% of Australia's wine grape growing area and ~25% of the national crush. Growers were already collecting annual data (e.g. water, energy and fertiliser use as well as production) in order to conduct benchmarking, planning, evaluation, control and communication around the sustainability of their business.

This project harnessed and built on the existing Sustainable Winegrowing Australia network and datasets. With the longer-term objective to improve access to finance in the wine industry through financial and environmental benchmarking, the agreed project aims were to:

1. Conduct industry benchmarking using Sustainable Winegrowing Australia environmental and production data as well as new financial data acquired from participating vineyards;
2. Develop a pilot sustainability indicator to test the quality and utility of the datasets collected; and

"From a wine business perspective, reporting sustainability credentials is becoming a standard process to enter the international wine market and Sustainable Winegrowing Australia validates our sustainability performance."

STEVE FIEBIGER, VITICULTURIST,
THORN CLARKE VINEYARDS,
BAROSSA, SOUTH AUSTRALIA

3. Test the hypothesis that sustainable on-farm practices (as measured by the pilot indicator) can predict financial performance.

RESEARCH

What makes a vineyard profitable and/or sustainable?

Two datasets were used to explore the characteristics associated with profitable and sustainable vineyards. The first dataset included three years of annual production and resource use metrics of 393 vineyards covering the period 2015-2018. The second dataset included annual production and resource use data from 291 vineyard businesses for 2018/19. Some financial metrics were also included in dataset 2, with gross profit margin available for 67 of the participating vineyards.

Key result 1: Financial data from winegrape growers facilitated benchmarking and increased participation in the Sustainable Winegrowing Australia program

The project collected financial data from 67 vineyards and used this to benchmark performance and identify characteristics associated with the highest and lowest performing vineyards according to gross margin. Overall, per tonne of grapes harvested, vineyards with the top 10% gross margin tended to have higher yields, lower operating costs and lower average selling price compared to vineyards with the bottom 10% gross margin.

The success of this part of the project is evidenced by the uptake of financial recording by growers who expect to derive benefit from collecting and sharing this data. Anecdotally, their motivation appears to be benchmarking and competition within the industry, which could be used to drive future engagement.

The value of the program is also shown by the increase in membership of the Sustainable Winegrowing Australia program, a trend that is predicted to continue. To assist with communication and marketing, Sustainable Winegrowing Australia has developed a trust mark that will also attract new growers to the program.

As this dataset grows, it will become easier for growers and financial institutions to understand factors affecting vineyard profitability and sustainability while industry benchmarking will help them track improvements.

Key result 2: Highly profitable vineyards may use resources more efficiently

A pilot sustainability indicator was developed for the Australian wine industry based on the concept of a corporate carbon footprint (CCFP)[3]. The Resource Intensity Score (RIS) is derived from a vineyard's water use, energy use and carbon emissions per tonne of grapes produced.

In general, vineyards with the top 10% gross margin were found to be more resource-use efficient than those in the bottom 10%; that is, they used 47% less water, 59% less energy and emitted 63% less carbon for every tonne of grapes produced (based on median values).

In the McLaren Vale wine growing region, which had the largest dataset (31 vineyards), the top 10% of vineyards also tended to be more resource-use efficient. However, the lower RIS score

for these top vineyards appeared the be mainly due to water-use efficiency as no difference in energy-use efficiency or carbon emissions was detected between top and bottom performing vineyards.

These preliminary results are positive so the next step will be to extend the analysis beyond the current dataset, which was relatively small and skewed towards a single geographical area. The following stage of this work should include more financial and production information from a wider variety of wine growing regions in order to improve the model and further test the relationship between resource-use efficiency (sustainability) and profitability. It will also be important to collect data from the same vineyards over time in order to test the resilience of businesses to stresses; for example, resource price shocks.

Key result 3: Can the RIS sustainability indicator forecast financial performance?

The third part of this project focused on developing a model to predict gross margin based on vineyard production and resource use data. Gross margin and other financial data are sensitive and not all vineyards chose to share it so a model could be useful to overcome this issue. This model also tested the hypothesis that a more sustainable vineyard, as indicated by a lower RIS, would be more profitable; that is, it would have a higher gross margin.

Preliminary results indicated that the dataset was too small and possibly too focused in one geographical area to identify any correlations between RIS and gross margin. More data from a range of regions, including times series, would help to refine the model and increase its predictive power.

NEXT STEPS

Opportunities for future impact

The results of this pilot project are promising and future work to improve sustainability and gross margin models could benefit individual growers, the wine industry and financial institutions.

Machine learning combined with more, and higher quality data, should improve the sustainability indicator and underpinning models. It will also enable their adaptation and validation across broader wine growing regions. This could be facilitated by data sharing methods, automated data input and integration with farm management tools.

Future work will enable a better understanding of potential trade-offs between environmental factors, financial and production decisions and how vineyards in different regions respond to environmental stresses over time. For example, growers in different regions may have different resource-use incentives depending on the price and availability of water and energy. The financial and production benefits of water-use efficiency may only become apparent when drought occurs and/or the price of water increases.

This dataset may also be used to understand business resilience in the context of resource dependencies and climate change. Almost all the vineyards in this study (97%) irrigated their grapes using river water and/or groundwater while only 2-12% used some form of recycled water. Vineyards are also heavily reliant on fossil fuels and non-renewable energy, for example,

95% of vineyards use diesel, 70% use petrol and 90% use electricity from non-renewable sources. This represents a risk to the businesses from changes in water and energy price/availability or a carbon tax. Future work on the RIS could change the relative weighting of the different resources to reflect investment in renewable energy, water recycling, biofuels and carbon sequestration.

This work will highlight adaptation options for the whole sector as well as allowing individuals to mitigate risk through altered management decisions. Growers will be able to see how future resource price scenarios may affect the long-term viability of their business and begin to directly link environmental data to their financial decisions. In the longer term, the goal of this research is to also develop a relevant decision-making tool for the financial sector.

CONCLUSIONS

This project developed the first sustainability indicator (RIS) for the Australian wine sector and conducted financial and environmental benchmarking to show that the more profitable vineyards also tended to be more sustainable.

This project successfully increased the quality, amount and accessibility of data not only for growers and industry but also for third parties such as financial institutions. This represents an important step towards a sustainable wine industry, as lack of information and lack of information flow have been identified as key challenges[4].

For winegrape growers and the wine industry, sustainability should contribute to continued operation, ongoing social licence and access to new markets. For the financial industry, supporting sustainability in the wine industry may reduce credit risk, increase the quality of assets and align with global initiatives such as the Natural Capital Finance Alliance and the Sustainable Development Goals.

We hope that these results will inspire and guide similar work across other agricultural sectors.