Predicting a product's shelf life

Kieran Hirlam[1], Denny Hsieh[1], Neil Scrimgeour[1], Eric Wilkes[1]

[1] The Australian Wine Research Institute, PO Box 197, Glen Osmond (Adelaide) SA 5064, Australia

Corresponding author's email: Kieran.Hirlam@awri.com.au

What is product shelf life?

- A product's shelf life is the amount of time it can be stored before it begins to show signs of deterioration.
- Deterioration can be biochemical, microbiological, physiochemical or based on aroma or taste.

Before commencing a shelf life study, it's important to:

- Understand client and consumer expectations. Shelf life testing is not a 'one size fits all' approach.
- Review the production process, packaging constraints and product consumption and storage conditions.
- Understand any regulatory requirements for the product being tested.
- Determine the testing method and modelling conditions required.

Primary testing methods

Direct method

- Real-world scenario
- Replicates storage and use conditions of the consumer

Accelerated shelf life

- Accelerates development through adjustments to temperature, humidity, lighting etc.
- Based on models specific to the product

Predictive microbiology

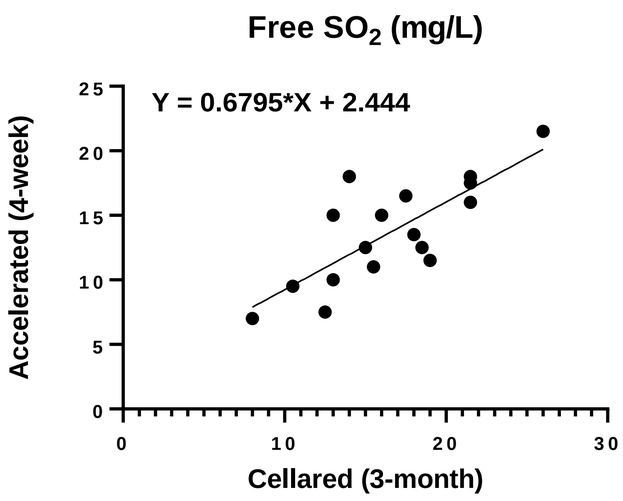
- Spot tests to identify microbial changes caused by varying environments
- Single feature study

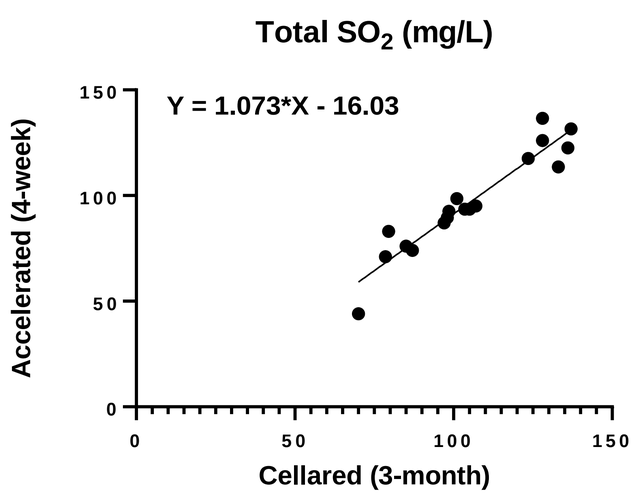
Challenge or stress test

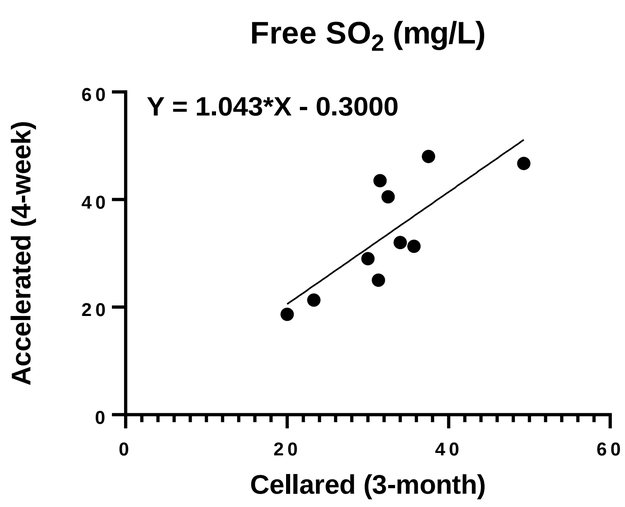
- Changing matrix to determine impacts
- Modelling supply chain conditions (static or dynamic loading)

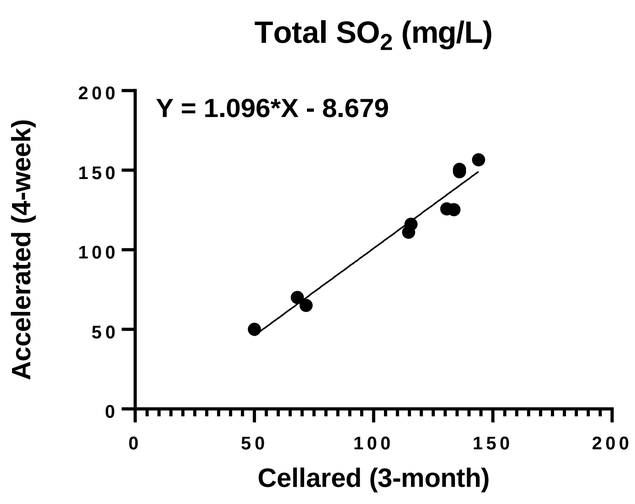
Accelerated shelf life testing and case studies

- Accelerated trials on wine-based products are based on modelling with the Arrhenius equation.
- Products are held at elevated temperature to accelerate development. The temperatures selected are targeted specifically so as not to promote unwanted chemical reactions.
- At these conditions, one week at elevated temperature equates to approximately one month of shelf life at ambient temperature, in terms of antioxidant depletion and colour development.
- Models for free and total SO_2 in can and bag-in-box products show that predictive models correlate well with real-world outcomes.









Wine Australia

The AWRI is a member of the Wine Innovation Cluster.

Affinity Labs