

Factors affecting the efficacy of sparging in South African white wines



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Introduction

There is currently a deficit of scientific literature regarding sparging white still wine with inert gas and its effects on the wine composition. Identifying factors which have the greatest impact on sparging efficacy could benefit the industry by reducing production costs.

Aims of study

The main goals were as follows:

1. Identify significant factors affecting efficacy of oxygen removal during sparging of wine.
2. Identify chemical changes in the wine composition due to inert gas sparging.

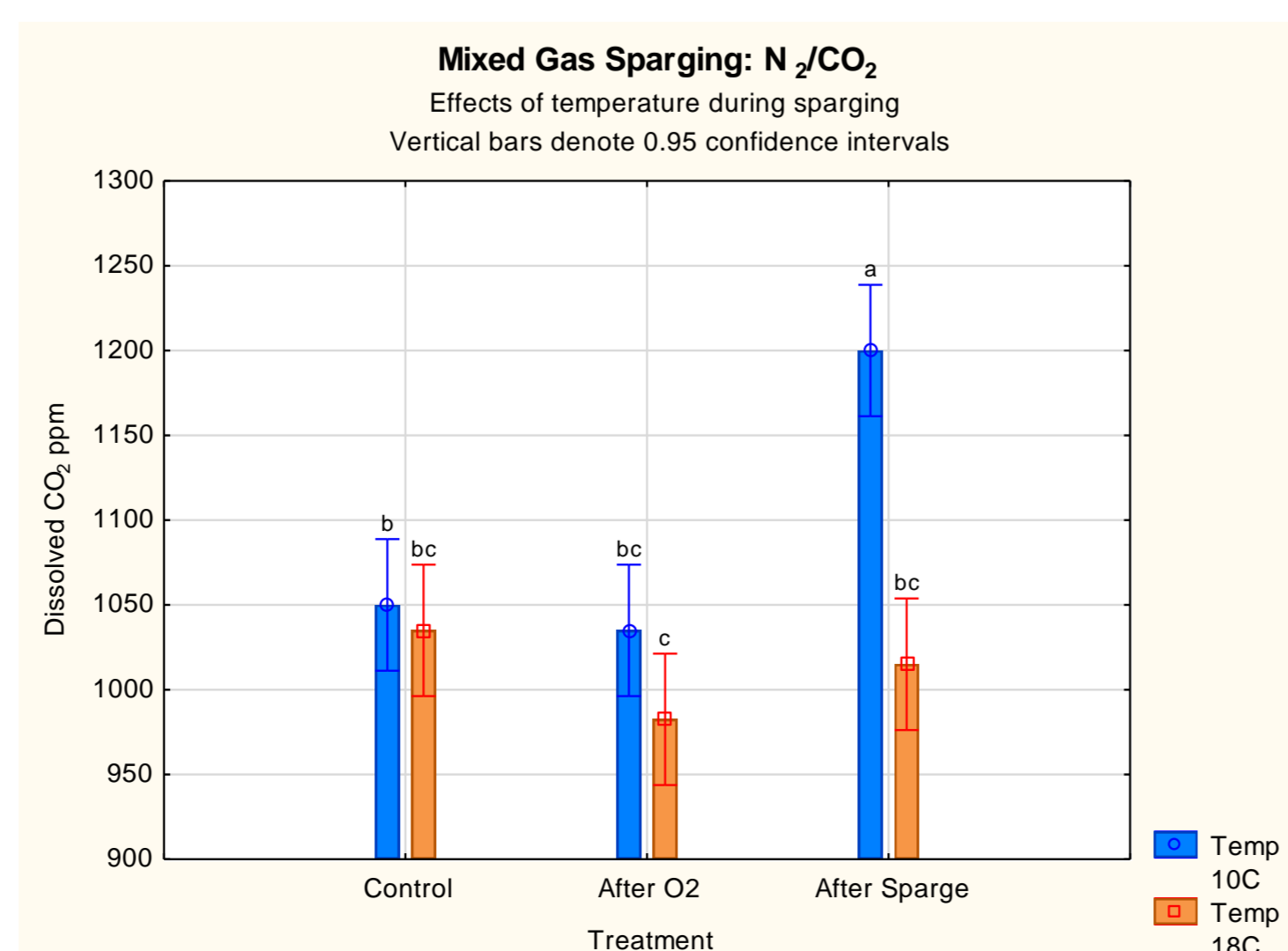
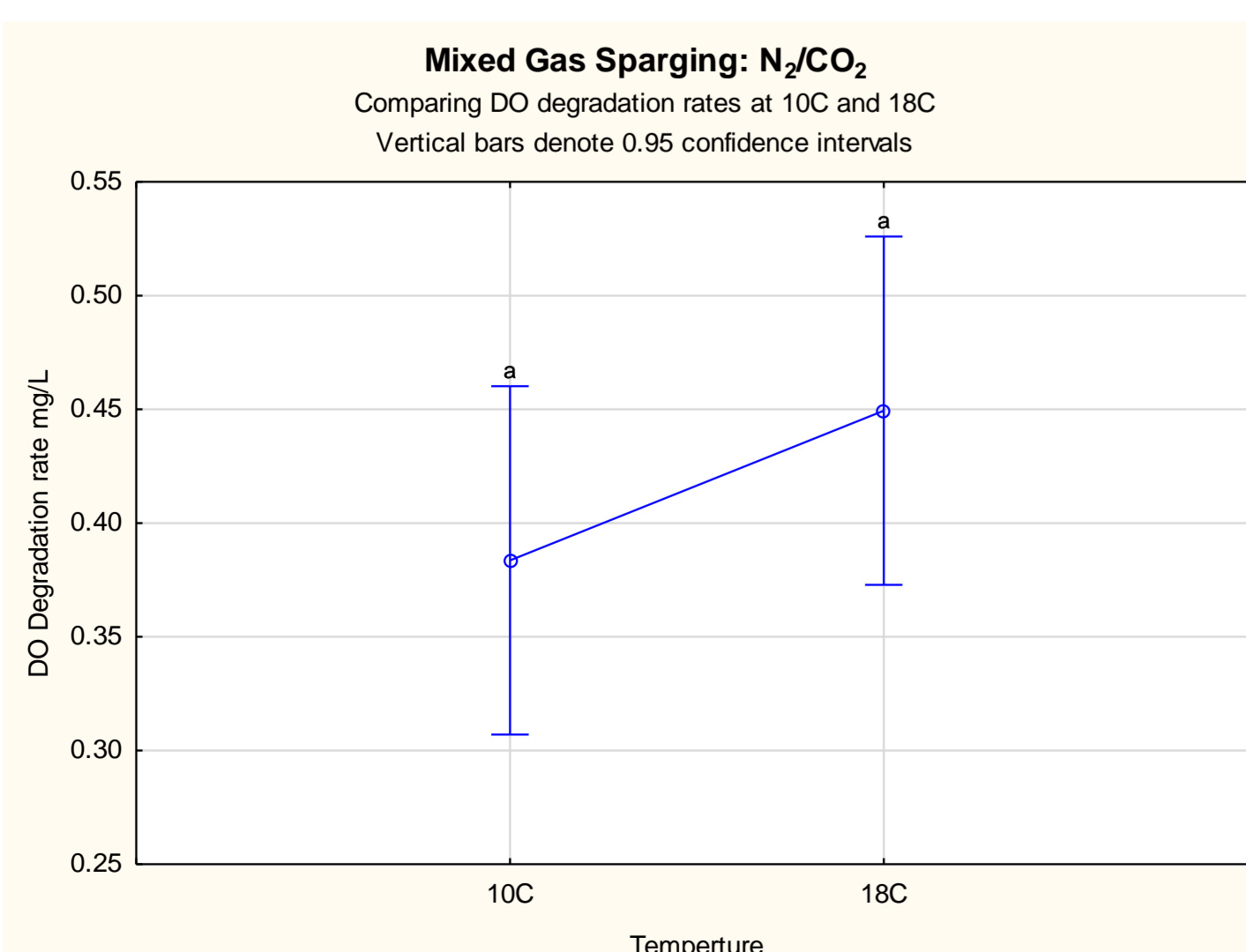
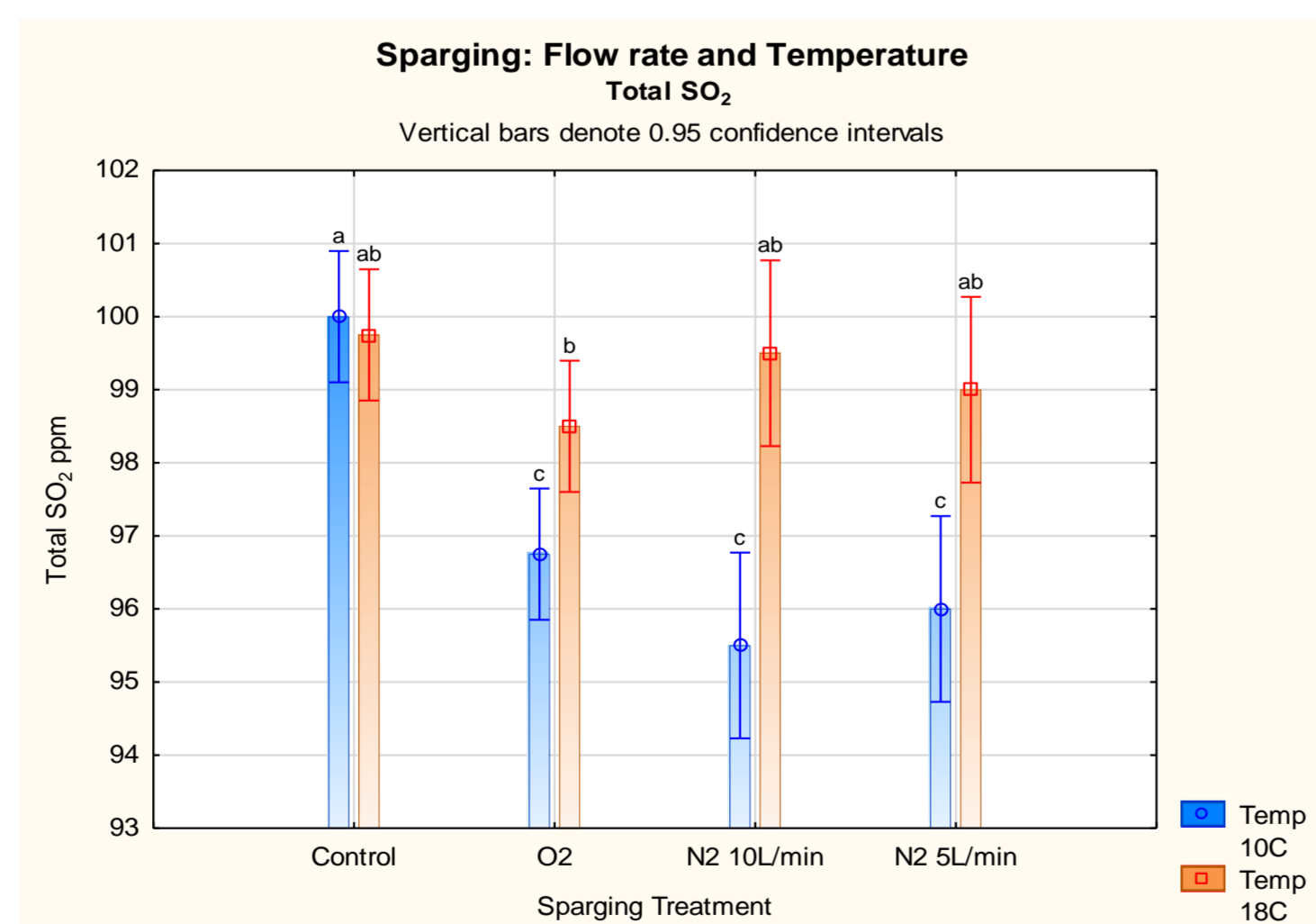
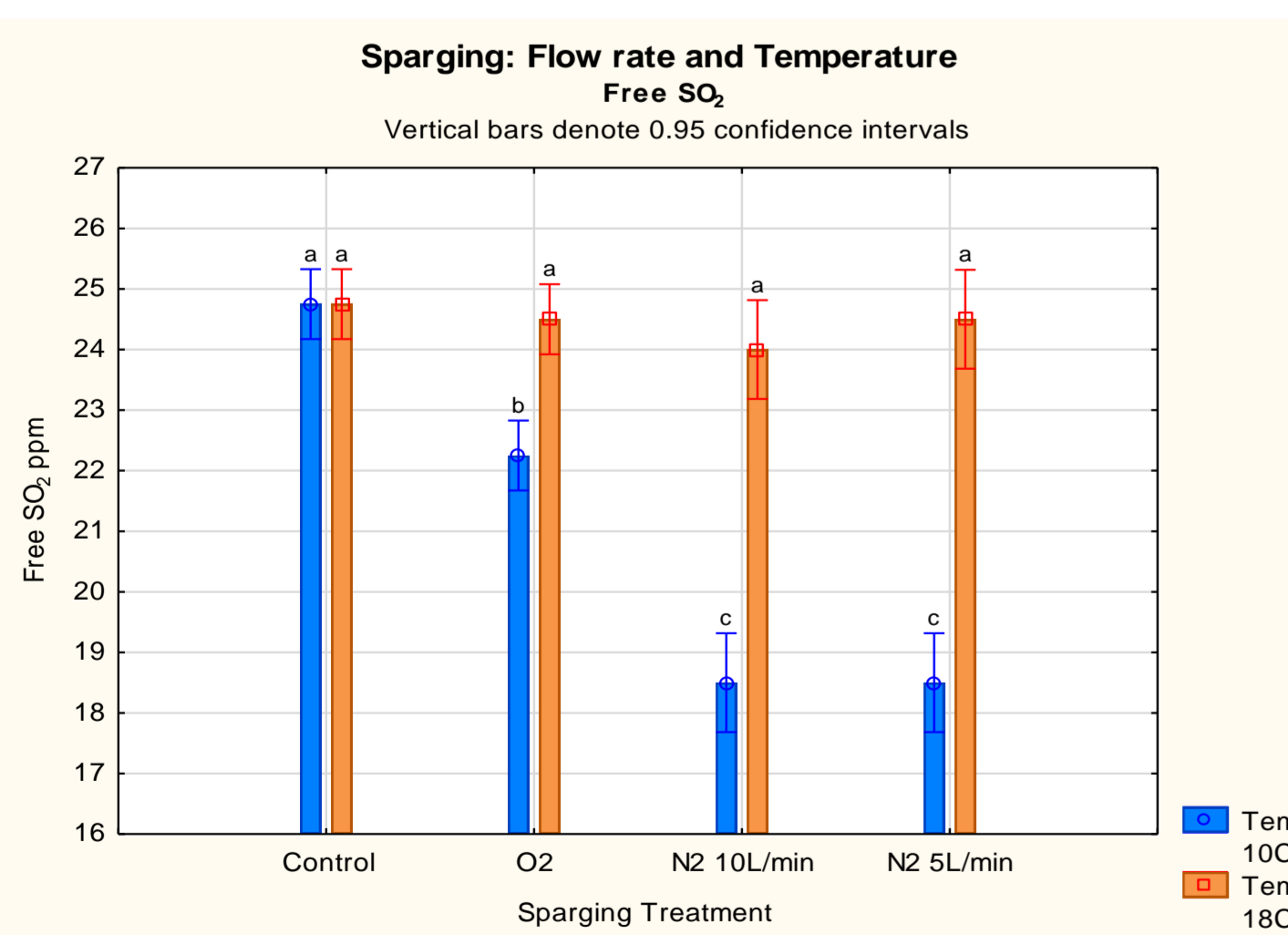
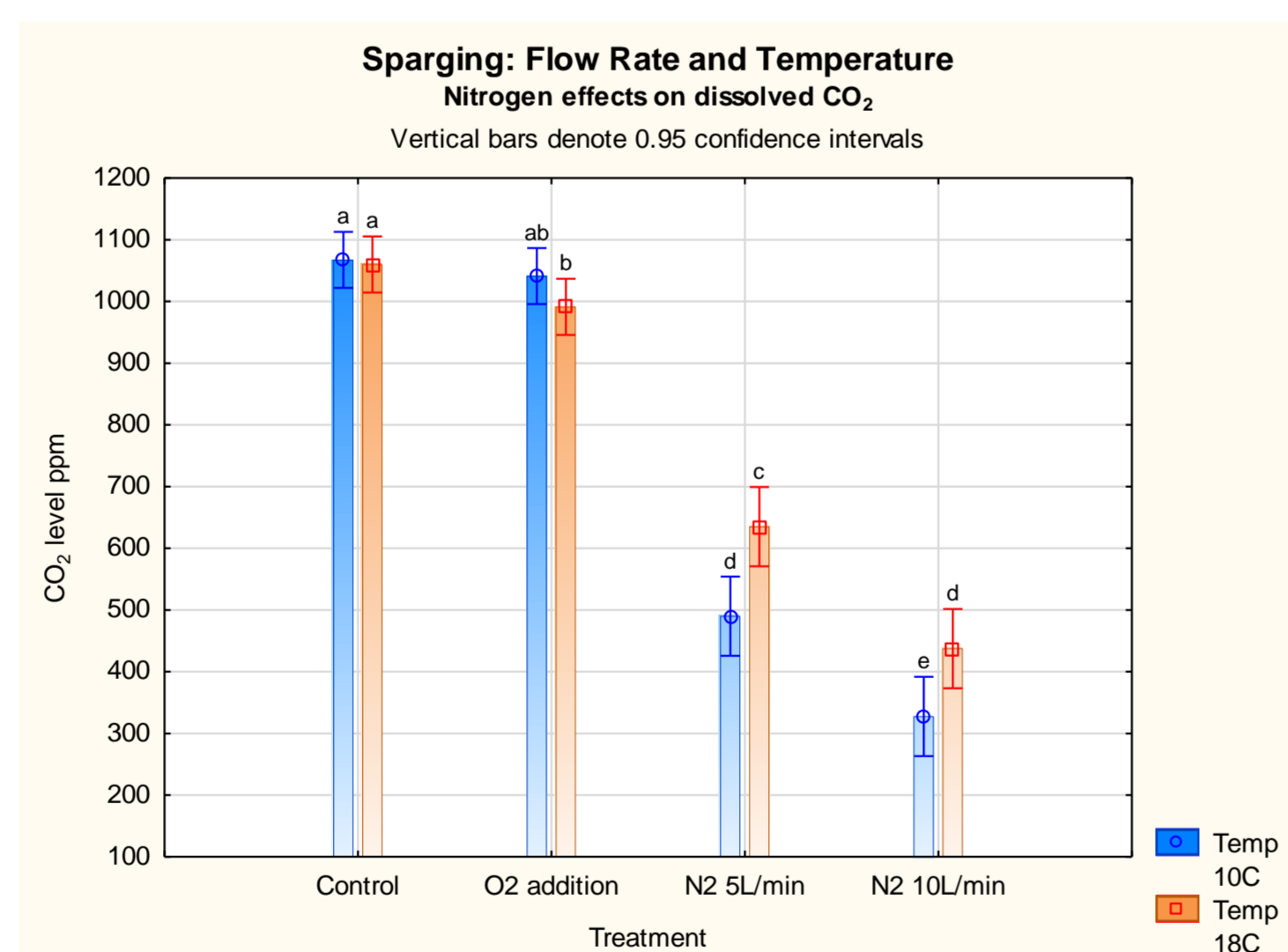
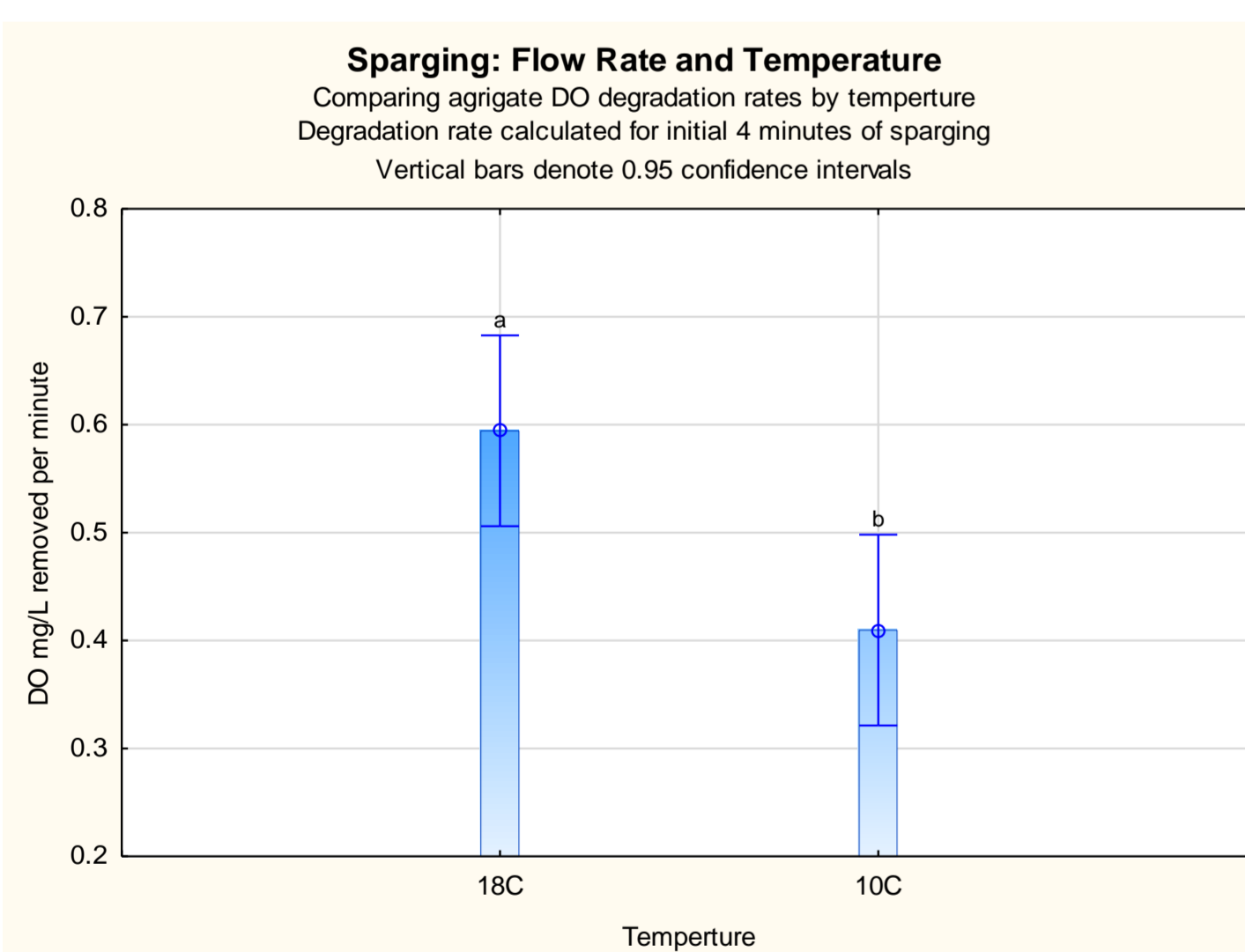
Experimental layout

Four bioreactors in the DVO experimental cellar were fitted with oxygen probes and 45 micron diffusion stones. The oxygen probes measured dissolved oxygen in the wine in real time and 45 micron diffusion stones were used as representative of industry practices. Varietal thiols, free and total SO₂, glutathione, colour, and dissolved CO₂ levels were analysed. **These experiments surveyed the following using a dry Chenin Blanc wine: effects of sparging a wine with nitrogen at different temperatures and gas flow rates, repeatedly sparging the wine with nitrogen gas, sparging wine with a mixed gas of nitrogen and carbon-dioxide, and sparging wine with nitrogen while testing the application of a diffusion stone dependent.**

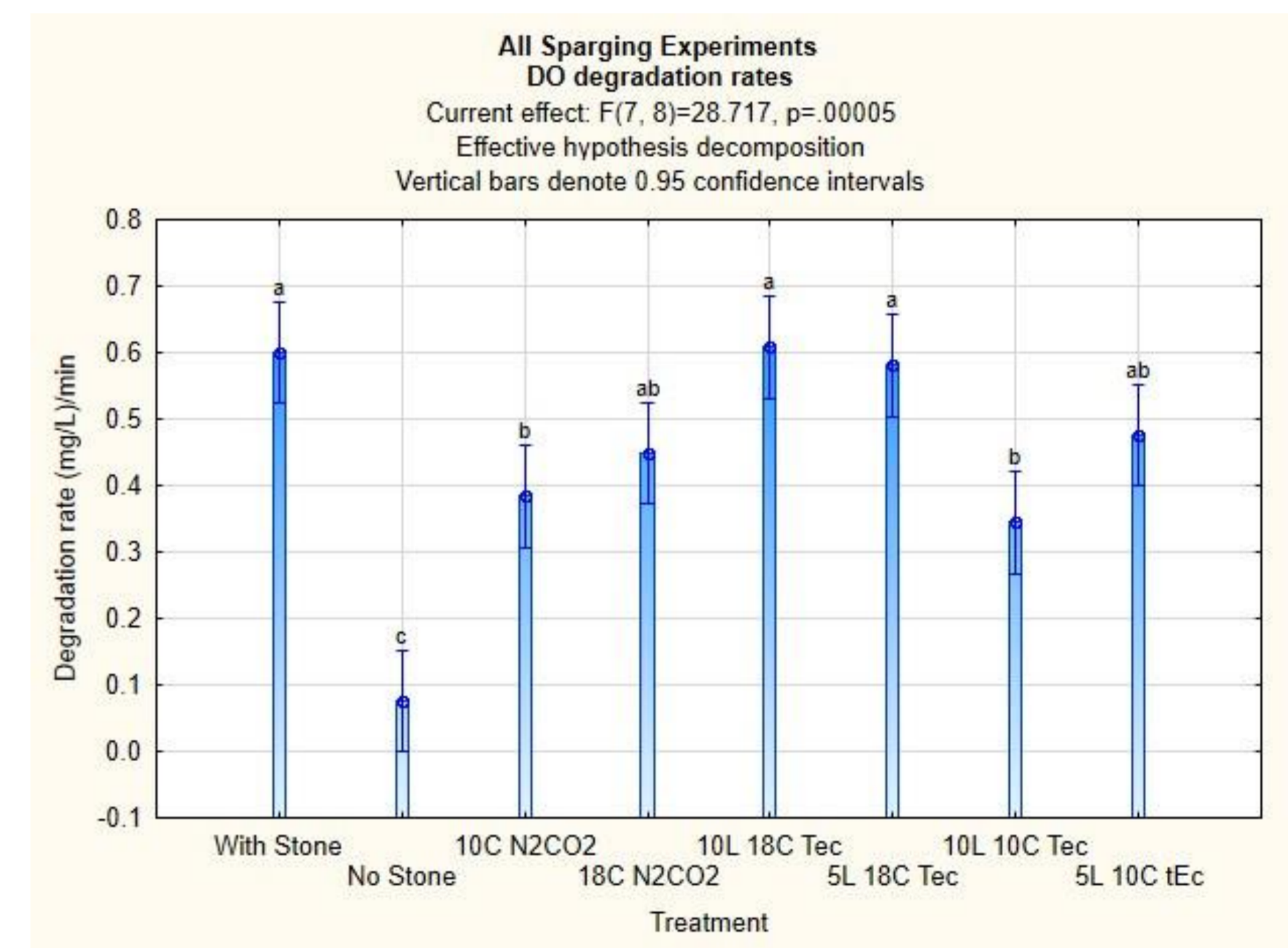
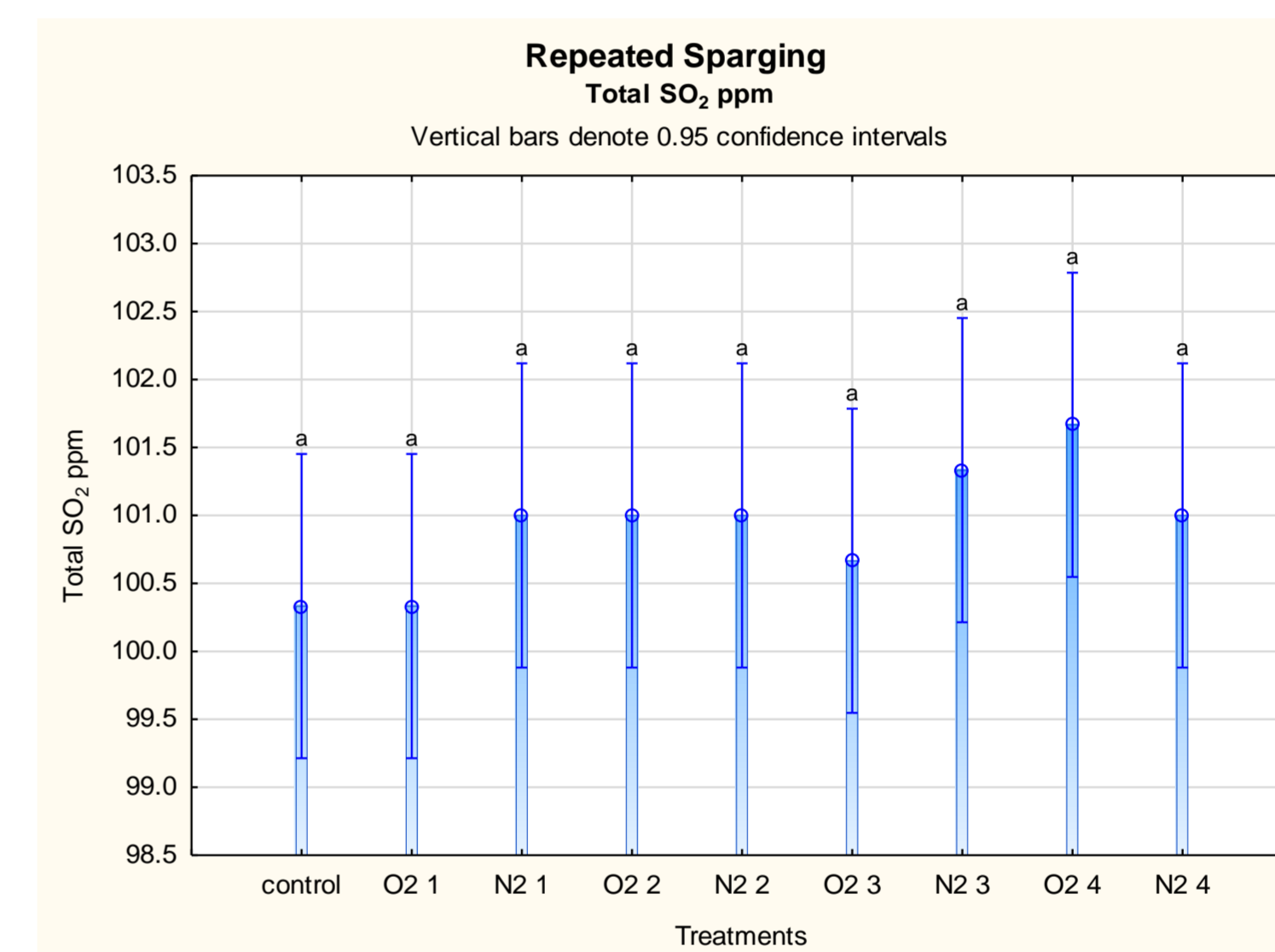
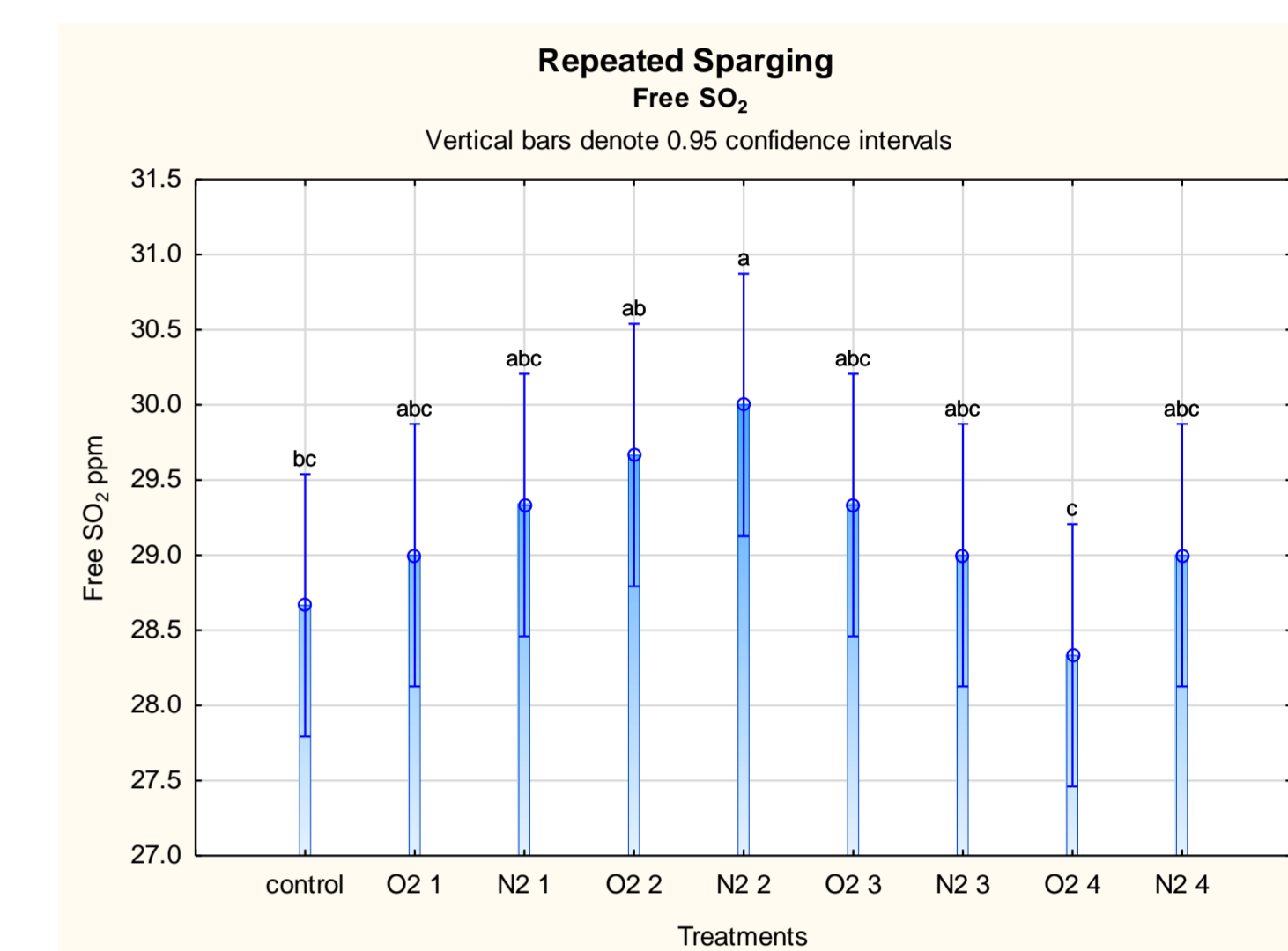
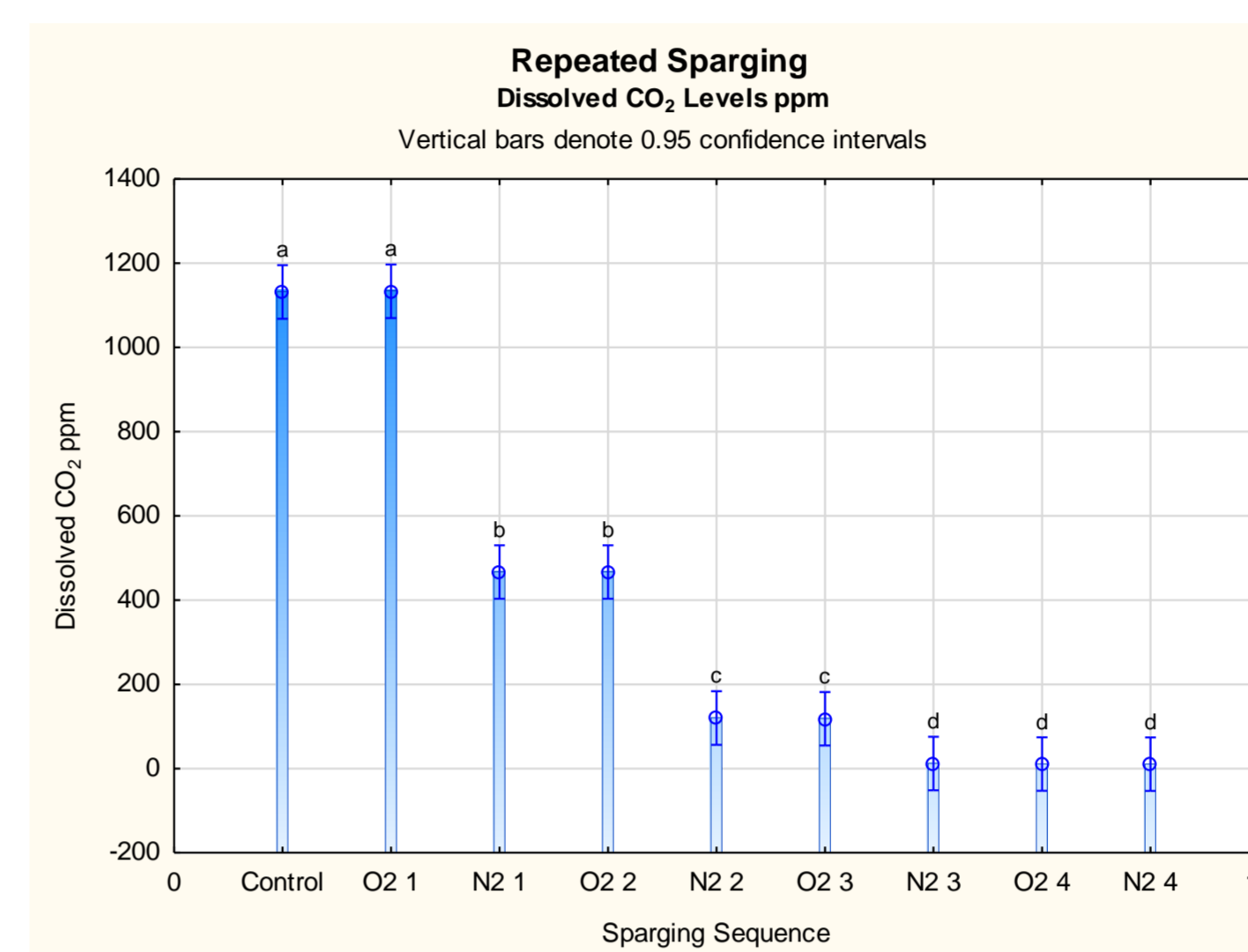
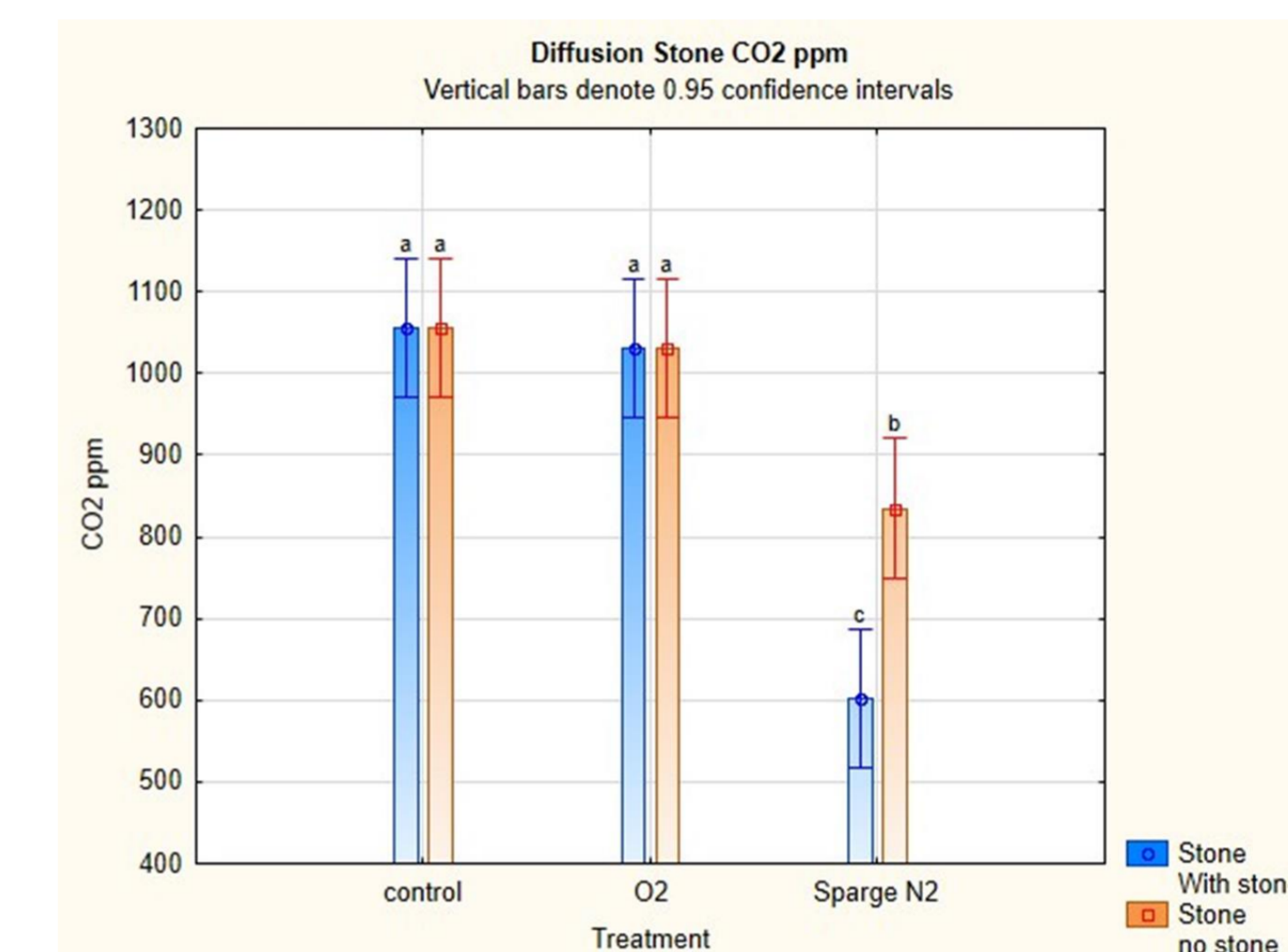
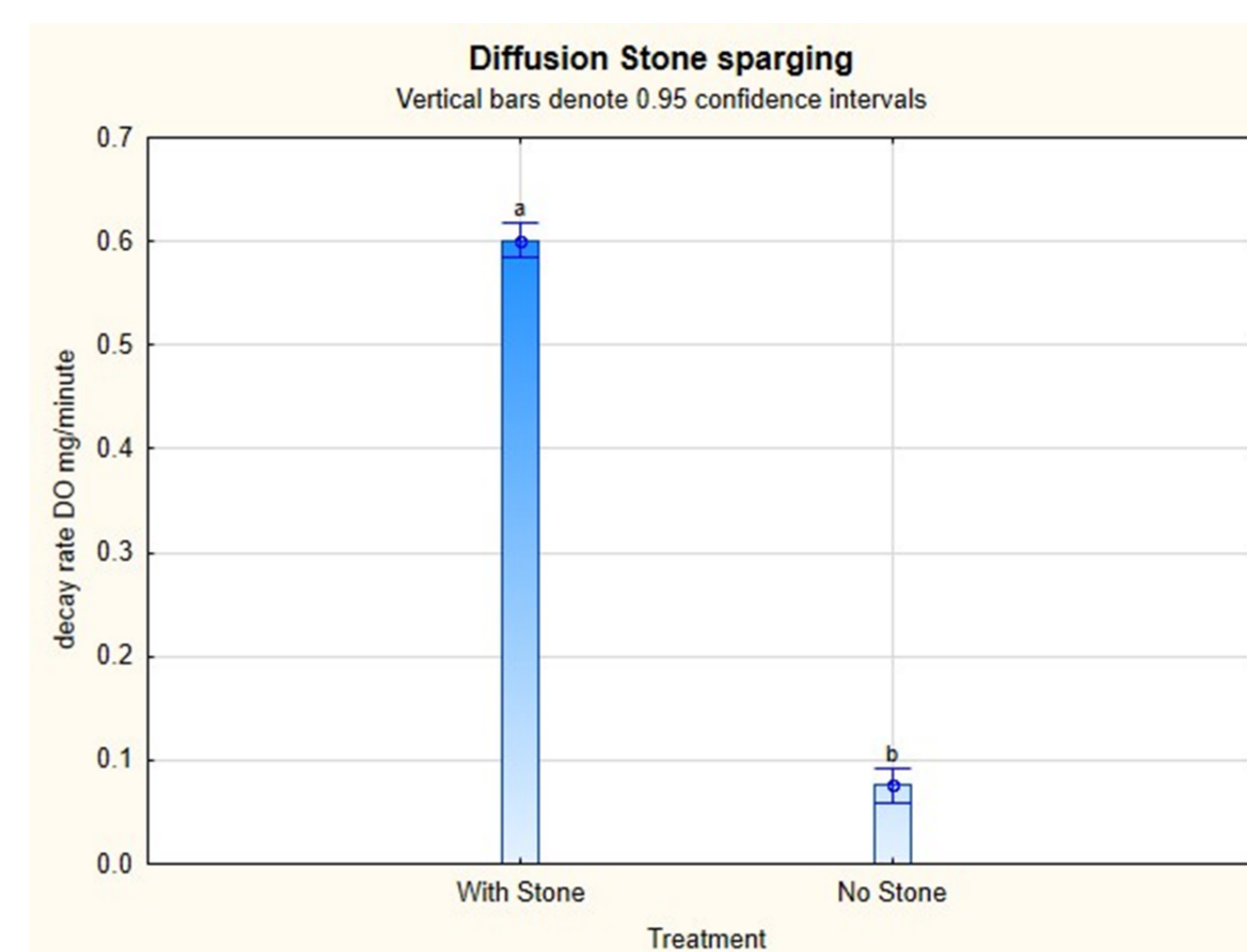


Results and Discussion

The results indicate wine temperature, gas composition, and mode of gas application have direct effects on dissolved carbon dioxide levels in the Chenin Blanc wine and on the rate of oxygen removal. However nominal effects on other assessed chemical compounds were found for thiols, colour, and glutathione. Inconclusive results were found for free/total sulfur dioxide levels. Changes in free sulphur dioxide were found in the flow rate and temperature experiment, but not in subsequent sparging experiments.



Results and Discussion continued...



- Temperature was found to have a significant effect on the efficacy of sparging, where lower temperatures decreased the rate of oxygen removal. Greater amounts of dissolved CO₂ were lost at lower temperatures than higher temperatures. Even though the solubility of CO₂ increases at lower temperatures, so does the solubility of dissolved O₂. The slower rate of oxygen removal at lower temperatures is correlated with the increased loss of dissolved CO₂.
- The use of mixed gas (N₂ and CO₂) to remove dissolved oxygen resulted in no loss of dissolved CO₂ at 18C and increased dissolved CO₂ at 10C.
- Use of a diffusion stone radically increased sparging efficacy.
- Repeatedly sparging a wine only resulted in the loss of dissolved CO₂.
- Inconclusive results were found for affects of sparging on free and total SO₂.

Conclusion

Sparging a Chenin Blanc wine with nitrogen and a mixed gas of Nitrogen and carbon dioxide do not seem to influence thiol levels, colour, and glutathione levels. Significant losses of dissolved carbon dioxide may however occur. Sparging wine with a mixed gas did not decrease dissolved CO₂ levels and can even increase it at lower temperatures. Using a diffusion stone seems to radically increase sparging efficacy, indicating the industry should contemplate investing in the technology as it can potentially reduce inert gas costs. Further research needs to investigate the effects of sparging on the sensorial quality of wine.