

Temperature in the Wine Supply Chain: Data and Effect

Wine is sensitive to temperature, yet it is shipped mostly in non-refrigerated containers. For over 2 years we have tracked the temperatures of shipments of wine from vineyards in the Southern Hemisphere to the United States. Colleagues at the shipment origins inserted data loggers that record date, time, and temperature every two hours for up to 6 months. The data loggers were later retrieved from the importer, distributor, retailer, or final customer in the US.

To date we have recovered hundreds of data-loggers containing 150,000 temperature records for shipments from 5 different wine-producing regions --- Argentina, Australia, Chile, South Africa, and California --- to more than 20 different states of the US. Correlating temperatures with container location gives a detailed picture of the temperature risks to which wine shipments from the Southern Hemisphere to the US are subject. This includes both temperature extremes --- heat and cold --- and temperature variation, which can force the cork to move like a piston, drawing in air and then pushing it out, and so allowing the wine to oxidize.

We further consider the question of whether typical shipping temperatures damage wine. To explore this, we built a heating/cooling device to re-create arbitrary temperature trajectories, such as those recorded in actual shipments. This enables us to directly compare two bottles of the same wine, one exposed to the re-created shipping temperatures and one not. A panel of wine experts blind-tasted such pairs of bottles to see whether they could perceive any differences.

Authors:

Alejandro Mac Cawley
Georgia Institute of Technology and Pontificia Universidad Catolica de Chile
amac@uc.cl

John J. Bartholdi, III
Georgia Institute of Technology, USA
john.bartholdi@gatech.edu

Simon Dunstall
CSIRO, Australia
Simon.Dunstall@csiro.au

Esbeth van Dyk
CSIR, South Africa
FEvanDyk@csir.co.za

Raymundo Forradellas
National University of Cuyo, Argentina
kike@uncu.edu.ar

Martin Marchetta
National University of Cuyo, Argentina
mmarchetta@fing.uncu.edu.ar

Leorey Marquez
CSIRO, Australia
Leorey.Marquez@csiro.au

Sergio Maturana
Pontificia Universidad Catolica de Chile
smaturan@ing.puc.cl

H. Donald Ratliff
Georgia Institute of Technology
don.ratliff@isye.gatech.edu