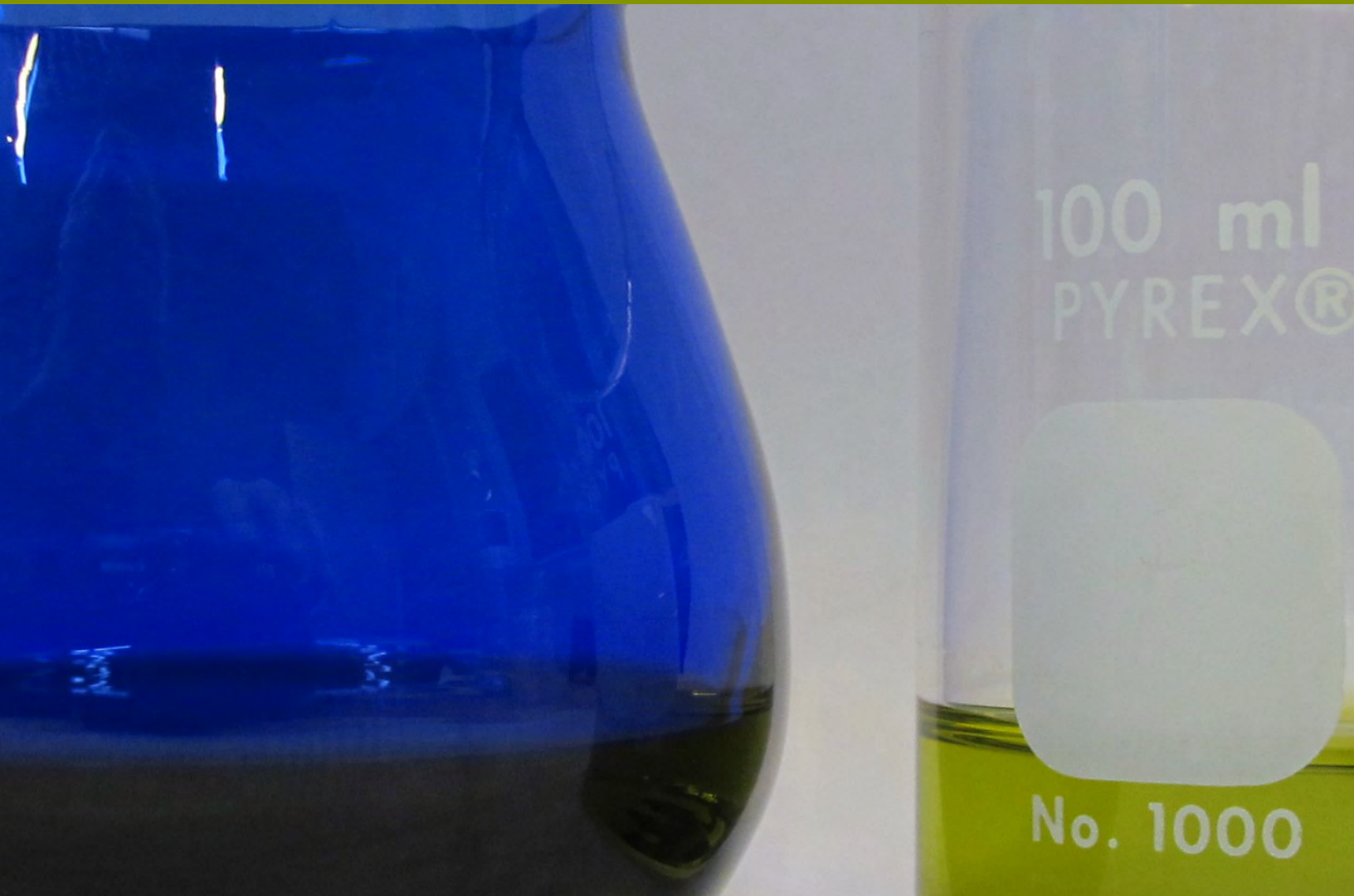


# Report

**Correlating olive oil sensory and chemistry results**

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**Introduction**

The United States Department of Agriculture (USDA) and International Olive Council (IOC) have adopted nearly identical chemical and sensory quality standards for extra virgin olive oil. The basic chemical quality tests are free fatty acidity (FFA), peroxide value (PV) and ultraviolet absorbency (K232, K270, and ΔK). Australia has augmented these standards with two additional chemical tests, diacylglycerols (DAGs) and pyropheophytin (PPP).<sup>1</sup> The standards are shown in the table at right.

EVOO test	Current standard
FFA	≤0.8
PV	≤20
ΔK	≤0.01
K232	≤2.50
K270	≤0.22
DAGs	≥35
PPP	≤17
Sensory	Defects = 0 Fruity > 0

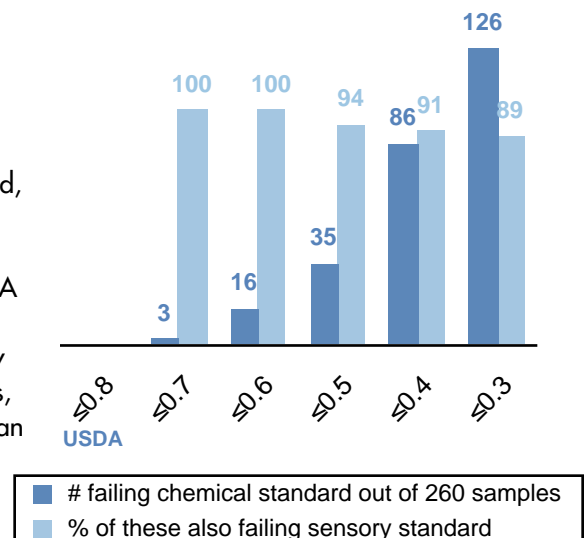
In previous reports, the UC Davis Olive Center has found that there is little correlation between the USDA/IOC chemical standards and the sensory standard, while Australian standards for DAGs and PPP have a stronger relationship with sensory results.<sup>2</sup> In this report, the UC Davis Olive Center examined chemical and sensory data from 260 imported and domestic “extra virgin” olive oil samples of varying quality, collected and analyzed by the center between 2010 and 2012, to investigate the extent that modifications in chemical standards could achieve a stronger correlation with sensory results. Chemistry data in this report is from the IOC-recognized Australia Oils Research Laboratory in Wagga Wagga, and sensory analysis was provided by at least one IOC-recognized sensory panel.

**Results**

Of the 260 samples, 141 failed the sensory standard. To get a perfect positive correlation between sensory and chemistry results, 141 samples would need to fail a chemical standard and 100 percent of those samples would also fail the sensory standard. Our results found that very few samples failed USDA/IOC standards for FFA, PV and ΔK, with 23 samples failing K232 and 29 samples failing K270. More samples failed the additional chemical tests adopted by Australia, with 67 failing the DAGs standard and 68 failing the PPP standard.

Modifying the chemical standards can increase the number of failing samples to approach the 141 samples that failed the sensory standard, but it is not always possible for those failing samples to achieve a perfect correlation with the sensory results. For example, Chart 1 shows that just none of the 260 samples failed the USDA’s current FFA standard of ≤0.8. Modifying the FFA standard to ≤0.6 leads to 16 failing samples, with 100 percent of those samples failing the sensory standard. Adjusting the standard to ≤0.5 leads to 35 failing samples, with 94 percent of those samples failing the sensory standard, while an FFA standard of ≤0.3 leads to 126 failing samples with 89 percent of those samples failing the sensory standard. The results for the other chemical tests are shown in Charts 2 through 7 below.

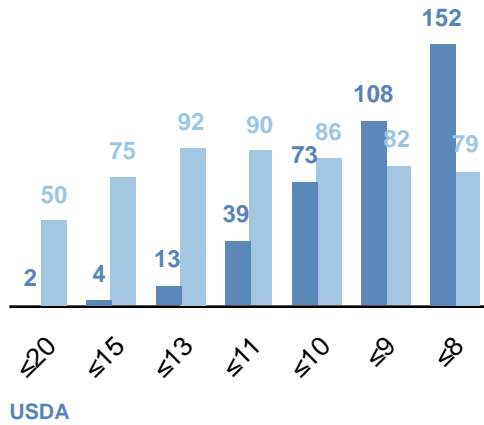
**Chart 1. Free fatty acidity (FFA)**



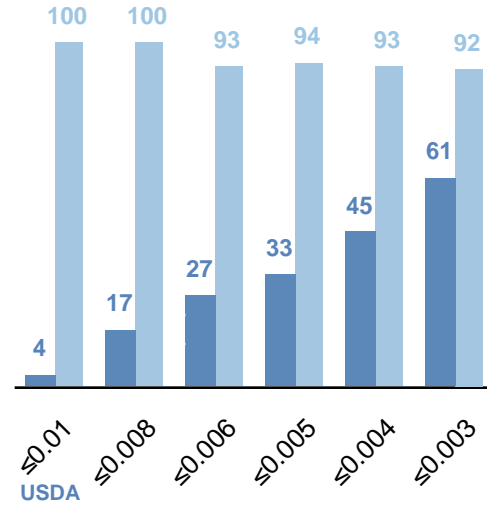
<sup>1</sup> The units for each test: **FFA** % as oleic acid; **PV** mEq O<sub>2</sub>/kg oil; **UV** K<sup>1</sup>%cm; **DAGs** % total 1,2- and 1,3-diacylglycerols; **PPP** % total pyropheophytins; **Sensory**: median score by trained panel of at least eight tasters.

<sup>2</sup> [Tests Indicate that Imported "Extra Virgin" Olive Oil Often Fails International and USDA Standards](#) Frankel, E. N.; Mailer, R. J.; Shoemaker, C. F.; Wang, S. C.; Flynn, J. D. 2010; [Evaluation of Extra-Virgin Olive Oil Sold in California](#) Frankel, E. N.; Mailer, R. J.; Wang, S. C.; Shoemaker, C. F.; Guinard, J.-X.; Flynn, J. D.; Sturzenberger, N. D. 2011; [Evaluation of Olive Oil Sold to Restaurants and Foodservice](#) Wang, S. C., Frankel, E. N., Flynn, J. D., 2012.

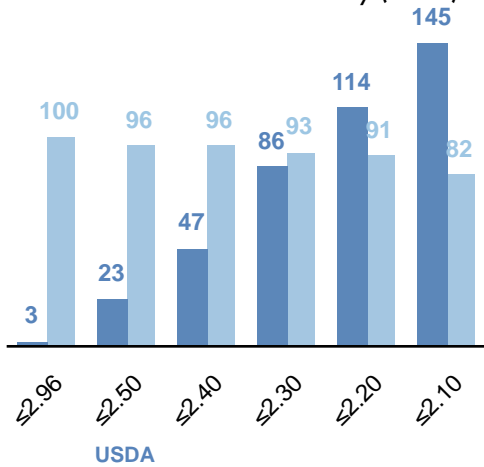
**Chart 2.** Peroxide value (PV)



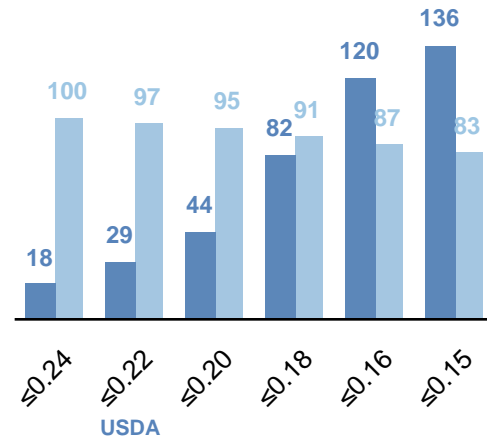
**Chart 3.** Ultraviolet absorbency ( $\Delta K$ )



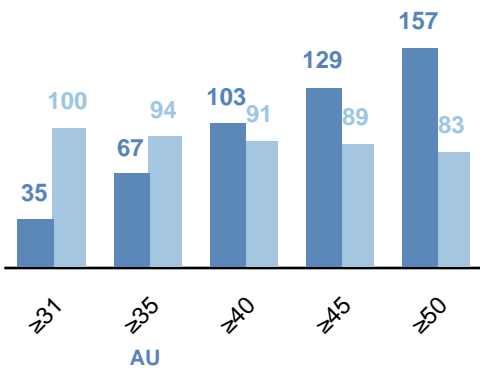
**Chart 4.** Ultraviolet absorbency (K232)



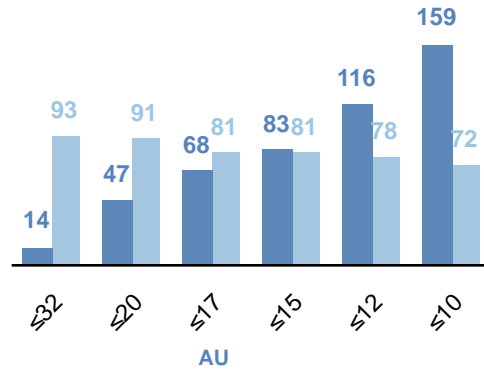
**Chart 5.** Ultraviolet absorbency (K270)



**Chart 6.** Diacylglycerols (DAGs)



**Chart 7.** Pyropheophytin (PPP)



■ # failing chemical standard out of 260 samples    ■ % of these also failing sensory standard