A Perspective on Extra Virgin Olive Oil and Premium Quality: California olive oils

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Recent reports by UC Davis Olive Center have heightened awareness that some olive oil in the market today does not meet the sensorial and/or chemical requirements for the grade of Extra Virgin. As a result, many people in the industry have new concerns.

Olive oil producers may wonder how their oils would have performed in a similar survey. Will those wonderful oils proudly displaying a quality seal remain Extra Virgin after 12 months? How do their oils compare with other fresh oils in the market?

Olive oil buyers and marketers may wonder how to judge new sources based on the analysis report of an oil sample. All the quality parameters appear to meet the IOC/USDA standards. Is the quality, therefore, *certified*? Is there anything that can be inferred from the laboratory report? Can the risk of sourcing a rapidly deteriorating product be reduced?

What do the quality parameters say about an oil?

First, let's contrast the USDA standards with those of a certifying organization, such as the California Olive Oil Council (COOC). Both address EVOO grade and quality, but with different aims:

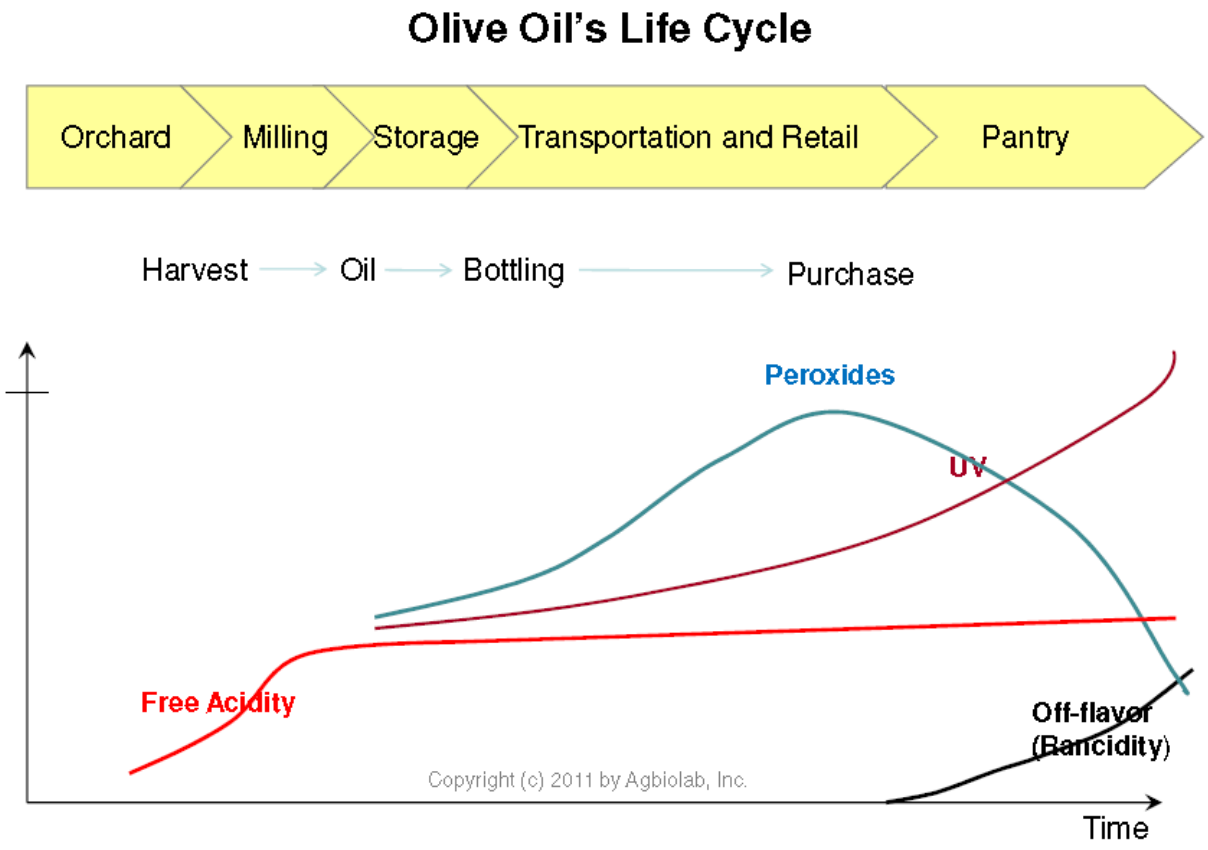
- USDA standards apply to *any oil*, of *any age or provenance* for sale in the US. This oil may be from a recent harvest—or not—and it may be domestic or imported.
- COOC certification is awarded to California-produced EVOO from a recent harvest: COOC-certified EVOOs are *fresh oils*—six months of age or less.

Both USDA and COOC require sensorial and chemical tests. As we know, sensorial tests identify defects, balance and positive attributes, while chemical tests measure biological and chemical processes in the oil, assessing fruit quality, oxidation, and any deterioration that, with time, will develop off-flavors. However, for fresh oils the *desired* chemical parameters should be quite different than for any old oil.

The rule of thumb for chemical tests is 'the lower, the better', and when monitoring deterioration over time, 'the lower, the fresher'. Only refined oils chemically treated to strip peroxides and free fatty acids will have artificially low levels of both—that magically meet the standards while depleting the beneficial

antioxidants. What should the reasonably achievable thresholds be for these values to ensure quality? What if a sample shows unrealistically low values? Can anything be inferred from the analysis report?

The biggest risk for olive oil producers and traders is to approach quality with a "pass/fail" mindset: the notion that if a quality parameter is below the set threshold for EVOO grade, then the oil is fine. Well, it may not be that easy. Here is why:



The picture shows at the top the phases of a natural oil's life cycle, from orchard to consumer. An idealized chart at the bottom shows the progression of degradation that inevitably will take place—even for high quality oils kept in ideal environmental conditions. How the chart describes the specific oil's journey will depend on ***the parameter values when the oil is fresh***.

For example, early high peroxides or UV absorbance will indicate a much faster deterioration, where rancidity develops faster: **the chart will compress to the left**. Early low peroxides/UV absorbance will have the opposite effect: **the chart will stretch to the right**, with the oil remaining viable longer.

- High free acidity (FFA) is indicative of poor fruit quality or milling conditions. If acidity is high on fresh oil, this oil may either fail a sensorial test or will taste bad within a short time.
- Peroxide Value (PV) and Ultraviolet (UV) absorbance will show measurable increments with time. K232 and K270 measure the development of further deterioration and the onset of rancidity. Since these values grow over time, oils that exhibit relatively high peroxide when fresh

will quickly deteriorate. The same is true of oils with a high K232 value. An EVOO with a K232 of, say, 1.8 may approach 2.0 within months, even under proper storage. What should the ideal PV and K232 thresholds be to ensure quality downstream?

Fresh Extra Virgin Olive Oils

There are no published analytical results of extra virgin olive oil from California to use as reference. In Appendix A of this document, we show analytical values our laboratory has measured on California olive oils during the 2009-10 crop year. This is actual data from a cross-section of large, medium and small California producers. It clearly illustrates that most fresh oils meet more stringent analytical thresholds than USDA's:

Parameter	Fresh Oil	USDA Threshold	3E Threshold
Peroxide Value	lower than 8 meq O2/Kg	20 meq 02/Kg	7.5 meq 02/Kg (8 for organic EVOO)
Free Fatty Acids	below 0.3 % oleic	0.8%	0.3%
UV – K 232	between 1.4 and 1.8	2.5	1.85 (1.9 for organic EVOO)
UV – K270	clusters around 0.100	0.22	N/A
UV – Delta K	Negative value	+0.01	N/A

How good are these numbers? For comparison, see the rightmost column that shows the corresponding parameters advocated by 3E, the Italian organization behind Super-Premium Olive Oil ("Beyond Extra Virgin").

Olive Oils of undetermined age

What to make of oils that, though meeting the USDA's EVOO thresholds at bottling, exhibit analytical values that are quite high? It may be reasonable to conclude that they are likely to deteriorate quickly and soon show analytical and sensory attributes that will fail the EVOO grade.

Conclusion

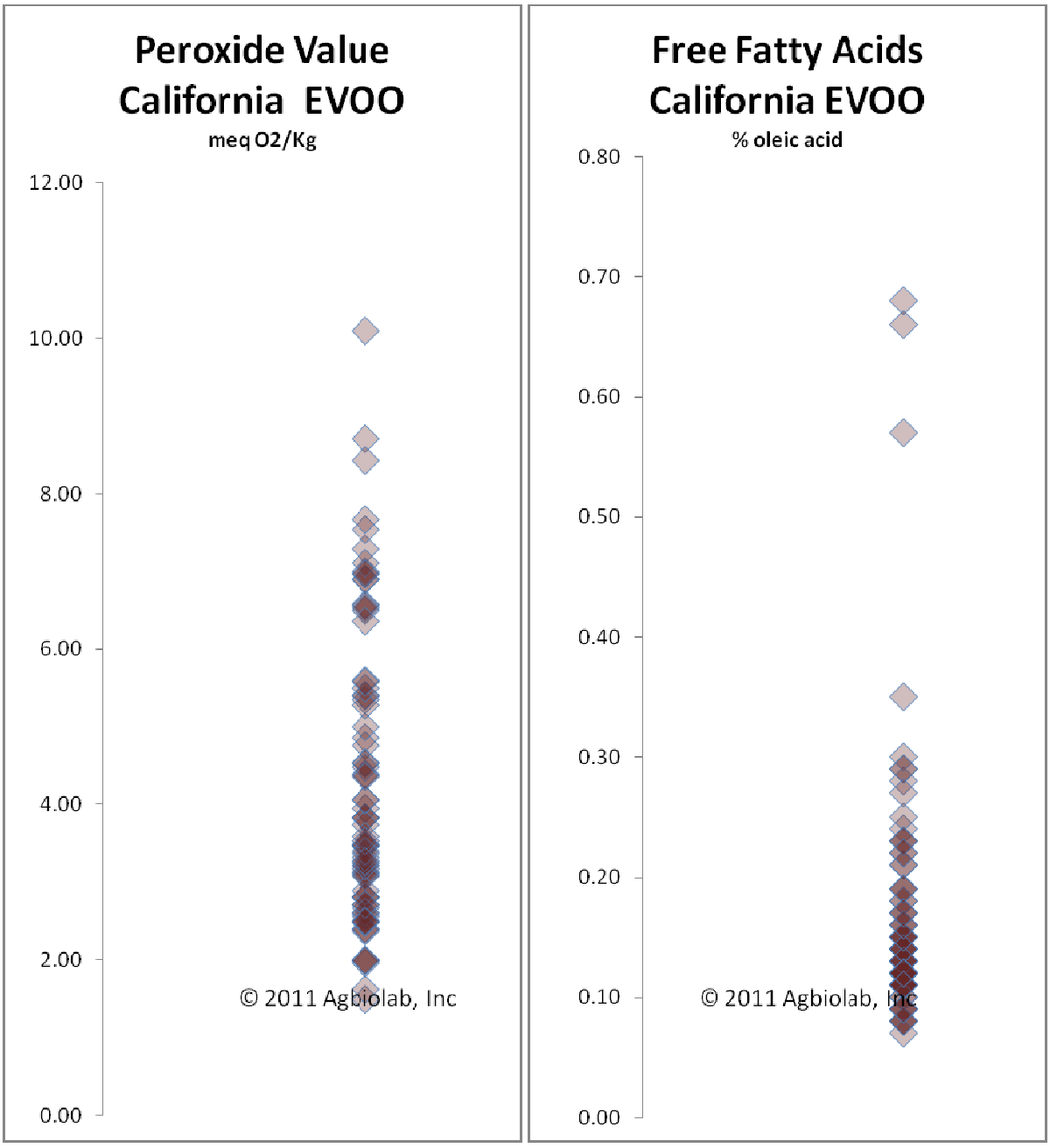
In our experience, most California extra virgin olive oils easily meet premium quality metrics. The analytical values in the appendix graphs can be used as reference. The bottom line: lower analytical values should be expected in fresher oils.

Industry certifying bodies may consider lowering their analytical thresholds to reflect that they are certifying fresh oil instead of applying regular trade standards. Such a move would be well within the achievable parameters for most producers and would give credence to the "Best before" date claim. More importantly, certification would reflect the superior quality and freshness of these fresh oils.

Likewise, oil buyers and traders must pay close attention to analytical results and complement them by a sensorial assessment of the oil. Particularly when parameters are very close to the thresholds or when they appear unrealistically low.

Appendix A – Laboratory Results

NOTE: The darker the diamond, the larger the number of oils showing those values.



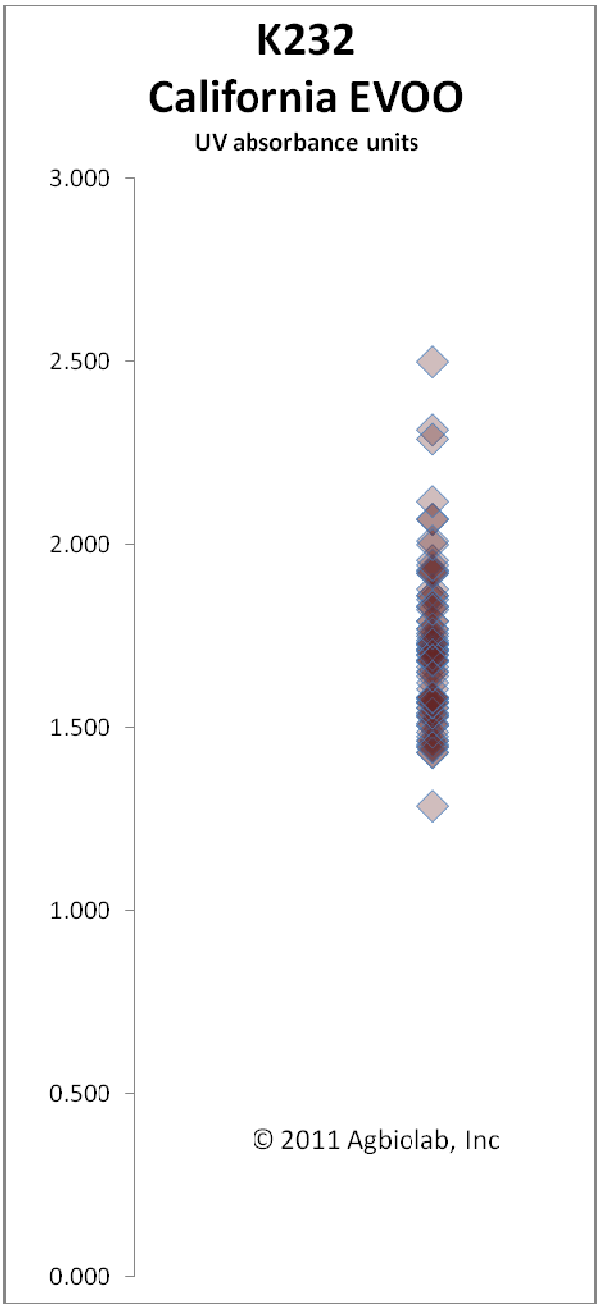
USDA thresholds for EVOO are:

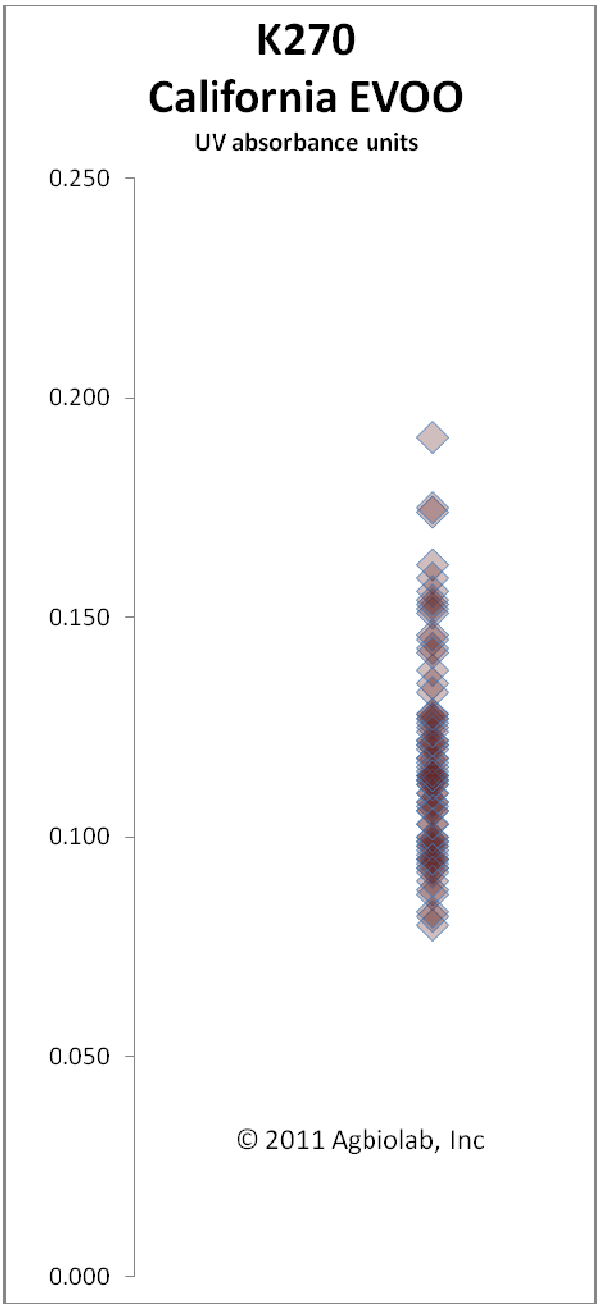
- Peroxide Value ≤ 20 meq
- Free Fatty Acids ≤ 0.8 % (COOC's is ≤ 0.5%)

3E thresholds for premium EVOO are:

≤ 7.5 meq (8 meq for organic)

≤0.3 %



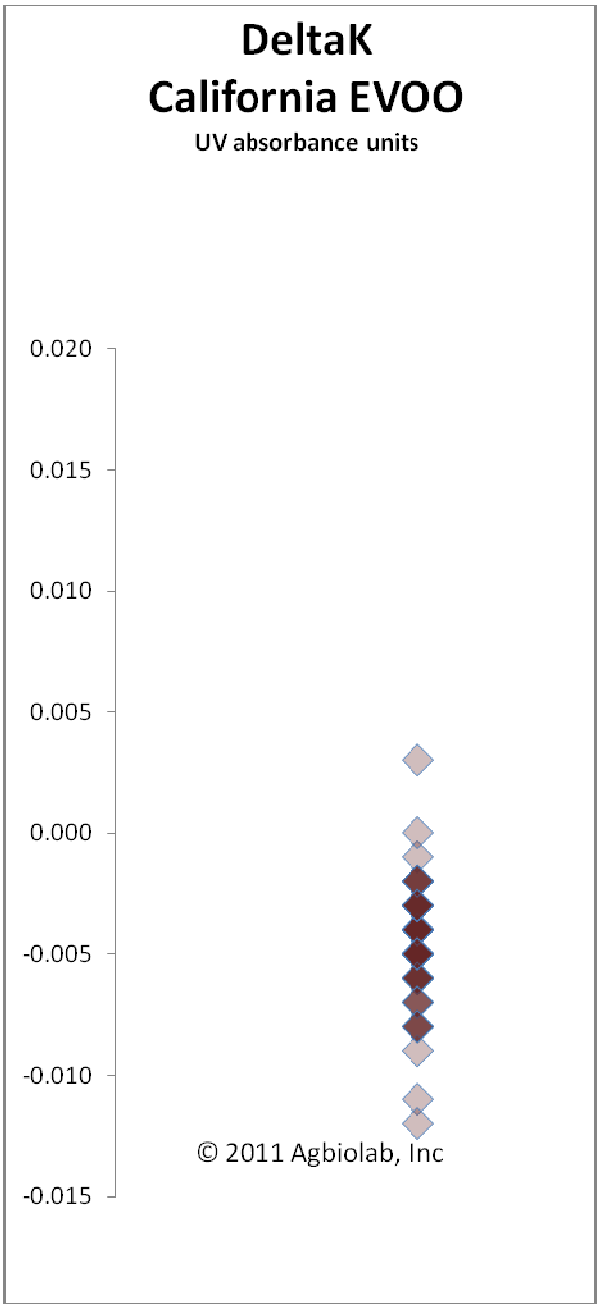


USDA's thresholds for EVOO are:

- K 232 ≤ 2.5
- K 270 ≤ 0.22

3E thresholds for premium EVOO are:

≤ 1.85 (1.9 for organic)



USDA's threshold for EVOO is Delta K ≤ 0.01.

NOTE: For fresh oils, Delta K is normally a negative value.

