Random Testing of Store-Bought California Extra Virgin Olive Oils: 67% Fail New Olive Oil Commission of California (OOCC) Standards

May 2015

Random Testing of Store-Bought California Extra Virgin Olive Oils: 67% Fail New Olive Oil Commission of California (OOCC) Standards

Contents

Executive Summary

On September 26, 2014, the California Department of Food & Agriculture approved new standards for a select group of California olive oil producers under the newly-formed Olive Oil Commission of California (OOCC). Supporters maintain the new OOCC standards will ensure California olive oils are authentic, premium quality extra virgin olive oils. The standards, however, vary significantly from international, national and even existing California state standards, and include two new test measures known as PPP and DAGs which have been rejected as unreliable by world experts for industry use. The new OOCC standards also eliminated a number of chemical analyses used by existing standards to detect adulteration because the OOCC claimed olive oils produced in California could not easily meet those standards.

The North American Olive Oil Association (NAOOA) has been testing olive oils off-the-shelf from the U.S. and Canadian markets for more than twenty-five years to verify compliance with International Olive Council (IOC) standards, which are the benchmark for the global olive oil industry. In 2015, the NAOOA collected eighteen unique samples of California-produced extra virgin olive oils from stores in California and New Jersey and had them tested for chemical compliance with IOC standards. In addition, the NAOOA had these oils tested for compliance with the newly-established OOCC standards.

The NAOOA's screening found that two-thirds (67%) of the California extra virgin olive oils tested failed at least one chemical measure of the new OOCC standards and also that 28% failed one or more of the IOC chemical measures. These test results raise significant questions worthy of addition consideration:

- The cornerstones of the new OOCC standards for freshness and purity, the PPP and DAGs tests, appear to have created a significant hurdle for California producers to meet with off-the-shelf samples, accounting for 44% of the OOCC 67% failure rate.

- Elimination of the IOC adulteration standards in the OOCC standards appears to have been unwarranted – all eighteen of the California samples met the IOC standards the OOCC claims are difficult to meet – unnecessarily exposing consumers to the risk of adulterated olive oils.

- Without effective enforcement mechanisms, consumers of California extra virgin olive oils cannot be assured of getting the higher-quality, fresh extra virgin olive oil touted by the OOCC. Additionally, the failure rate of the samples for IOC quality standards is high compared to the NAOOA's experience with random sampling of international olive oils from retail markets.

Background

The NAOOA was founded in 1989 with primary missions of ensuring a fair and competitive market for olive oil sales and increasing consumption of olive oil in the U.S. and Canada. The NAOOA's membership represents the majority of olive oils sold in North America today, including all grades of olive oil from all parts of the world and sold in retail, foodservice and manufacturing channels.

The benchmark for global olive oil standards and trade is the International Olive Council, a United Nations chartered organization established in Madrid, Spain, in 1959. The members of the IOC represent 25 countries accounting for 97% of global olive oil production and 96% of world olive oil exports. Based on cooperative research, the IOC maintains the International Trade Standard for Olive Oils and Olive-Pomace Oils, and annually recognizes testing laboratories and sensory panels for accurate olive oil analysis capabilities.

All NAOOA members agree to adhere to the IOC standards. The NAOOA monitors the marketplace by collecting hundreds of samples each year to be checked by IOC-recognized laboratories for compliance with the standards. Since its inception, the NAOOA has been a supporter of implementing and enforcing IOC-based standards in the industry, by petitioning the Food & Drug Administration to establish a standard of identity for olive oils; supporting the voluntary US Department of Agriculture Grade Standards for Olive Oils; and gaining the establishment of state standards in Connecticut, California, New York and Oregon.

The NAOOA has collaborated with the growing California olive oil industry in the past, particularly with the California Olive Oil Council (COOC), to help establish IOC-based standards in the state of California in 2009 and through the USDA in 2010. Only a few short years after establishing these standards, some California olive oil producers surprisingly objected that their products couldn't meet the IOC standards and advocated instead for different requirements for local production. To support these initiatives, the Olive Oil Commission of California (OOCC) was formed and developed its own set of divergent standards which were approved in September 2014. The stated objectives of the OOCC standards are

> (a) Ensure the quality of oil produced from olives in California;
>
> (b) Enhance the continued growth of olive oil production through greater consumer and trade confidence in the consistent, high quality of California olive oils; and
>
> (c) Provide the producers, handlers, buyers and consumers of California oil with reliable and trustworthy information concerning the quality and grade of the product.

Compared to the IOC standard, the approved version of the OOCC standard tightens a few quality parameters, excludes a number of purity parameters, and adds new tests for measuring Pyropheophytin A (PPP) and 1,2 diacylglycerols (DAGs).

The OOCC claims that PPP and DAGs indicate the freshness of the oil and the presence of refined olive oil. The claim is based on data and recommendations from the UC Davis Olive Center, the Australian Oils Research Laboratory, the Modern Olives Laboratory of Australia (and soon California), and the American Oil Chemists Society (AOCS). On the other hand, world experts and the IOC have examined PPP and DAGs and rejected them for use in trade standards for two reasons – first, research showed a large number of false positives when testing the oils for freshness and second, there is no way of knowing if the results are due to poor quality olive oil or simply to storage conditions. There is no scientific evidence that PPP or DAGs directly detect refined olive oil mixtures.

The OOCC also proposed a relaxation of the adulteration tests in the IOC standard, maintaining that California-produced olive oils routinely fail IOC limits for these tests because of the unique nature of local growing conditions. In addition to having insufficient science to set new levels, legally, the new standards could not include less stringent requirements than those that already exist in the mandatory statute established in the California Health and Safety Code (CHSC). Therefore, those purity measures were eliminated from the new OOCC standard entirely.

Testing and Findings

The NAOOA collected samples of California extra virgin olive oils from store shelves just as consumers would normally purchase them. Sixteen samples were collected from California stores in mid-January 2015 and an additional two samples were collected in New Jersey in March. The samples include sixteen different brands and eighteen unique SKUs representing a broad range of extra virgin olive oils from California producers. All eighteen samples were stored in a cool, dark place before being prepared as blind, unbranded samples in 500 ml dark glass jars to protect the oils from light and air. The samples were shipped to an IOC-recognized laboratory in Italy which analyzed the oils for all the chemical parameters in the IOC standard as well as analysis of the PPP and DAGs measures.

A reference of the various tests, limits, and interpretation of the measures according to the IOC standards is included as Appendix A. The main quality changes in the OOCC Standard compared to the IOC are outlined in Table 1

Table 1

Measure	Tests For	IOC Limit	OOCC Limit
Free Acidity (FFA)	Fruit quality & processing care	0.8	0.5
Peroxide Value	Primary oxidation; May change over time & with excessive heat, light or air	20	15
Absorbancy in Ultraviolet: K232	Oxidation and rancidity; Increases over time and with excessive heat, light or air	(optional) ≤ 2.50	≤ 2.40

In addition to the three quality changes, the OOCC standard requires California Extra Virgin Olive Oil to meet a limit of ≤ 17 for PPP and a limit of ≥ 35 for DAGs. The OOCC suggests a lower limit of PPP and a higher limit for DAGs indicate better quality, and also maintains these tests indicate adulteration with refined olive oil.

Full test results for each sample can be found in Appendix B. A summary of results compared to the more strict OOCC quality limits and standard IOC quality limits is outlined in Table 2 with failures highlighted:

Table 2

	PPP		1,2 DAG		FFA			Peroxide			K232		
Sample	**Result**	**OOCC ≤ 17**	**Result**	**OOCC ≥ 35**	**Result**	**OOCC ≤ 0.5**	**IOC ≤ 0.8**	**Result**	**OOCC ≤ 15**	**IOC ≤ 20**	**Result**	**OOCC ≤ 2.4**	**IOC ≤ 2.5**
1298*	17	at limit	47.2	Pass	0.28	Pass	Pass	9.8	Pass	Pass	1.61	Pass	Pass
1262*	13.4	Pass	40	Pass	0.33	Pass	Pass	27.7	Fail	Fail	4.34	Fail	Fail
1264*	21.4	Fail	43.1	Pass	0.23	Pass	Pass	11.2	Pass	Pass	1.75	Pass	Pass
1266*	28.8	Fail	39.5	Pass	0.23	Pass	Pass	8.9	Pass	Pass	1.81	Pass	Pass
1263*	12.5	Pass	50.1	Pass	0.20	Pass	Pass	11.4	Pass	Pass	1.93	Pass	Pass
1265*	19.4	Fail	43.5	Pass	0.26	Pass	Pass	9.8	Pass	Pass	1.6	Pass	Pass
1267*	12	Pass	49.2	Pass	0.24	Pass	Pass	9.9	Pass	Pass	1.69	Pass	Pass
1268*	10	Pass	38.9	Pass	0.39	Pass	Pass	17.5	Fail	Pass	2.65	Fail	Fail
1269*	48.7	Fail	38.4	Pass	0.22	Pass	Pass	20.1	Fail	Fail	3.02	Fail	Fail
1270*	7.4	Pass	78.7	Pass	0.14	Pass	Pass	11.1	Pass	Pass	2.02	Pass	Pass
1271	11.9	Pass	48.7	Pass	0.26	Pass	Pass	10.9	Pass	Pass	1.65	Pass	Pass
1272	12.4	Pass	47.4	Pass	0.26	Pass	Pass	11.9	Pass	Pass	1.63	Pass	Pass
1273*	14.2	Pass	50.3	Pass	0.22	Pass	Pass	15.4	Fail	Pass	2.37	Pass	Pass
1274*	12.5	Pass	48.6	Pass	0.26	Pass	Pass	13.8	Pass	Pass	2.57	Fail	Fail
1275*	13.4	Pass	33.8	Fail	0.56	Fail	Pass	15.1	Fail	Pass	2.65	Fail	Fail
1277	49.3	Fail	37.8	Pass	0.21	Pass	Pass	7.9	Pass	Pass	1.85	Pass	Pass
1278	18.1	Fail	46.2	Pass	0.24	Pass	Pass	8.0	Pass	Pass	1.69	Pass	Pass
1302	26.1	Fail	42.1	Pass	0.23	Pass	Pass	9.5	Pass	Pass	1.8	Pass	Pass

California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

Of all the samples tested, 67% failed at least one measure of the new OOCC standards. By contrast, only five samples (28%) failed one or more IOC quality measures. Only one of the samples (1269) failed a purity/adulteration measure (for stigmastadienes, which suggests contamination with refined oil) in addition to failing IOC and OOCC quality limits. However, that same sample passed the DAGs test which OOCC claims can detect adulteration.

A comparison of the quality measure results compared to OOCC and IOC standards is outlined in Table 3

Table 3

OOCC	PPP	1,2 DAG	FFA	Peroxide	K232
# of samples failed	7	1	1	5	5
%	39%	6%	6%	28%	28%

IOC	PPP	1,2 DAG	FFA	Peroxide	K232
# of samples failed	N/A	N/A	0	2	5
%			0%	11%	28%

The largest discrepancy is related to the new PPP test which 39% of the California extra virgin olive oils failed, and which OOCC proponents claim is useful for detecting freshness and the presence of refined olive oil.

The addition of the DAGs test and tightening of FFA and K232 made little difference in the results compared to IOC standards. The change in the OOCC peroxide limit would flag just one sample (1273) which did not already violate an IOC quality standard.

Conclusions

When the UC Davis Olive Center issued test results based on a sampling of fourteen imported olive oils in 2010, the headlines read “Most Imported Extra Virgin Olive Oils Are Not Extra Virgin.” Applying the new OOCC standards to California extra virgin olive oils could lead to the same conclusion – 67% of the samples tested did not meet the OOCC definition of extra virgin olive oil.

The NAOOA would not jump to that conclusion based on such a small sampling. Instead, it would appear the appropriate conclusion is that the fault does not lie in the oils, but in the new California law which adopted unproven and unreliable measures such as PPP and DAGs. The test results raise significant questions worthy of additional consideration. First and foremost, the results raise the question of whether PPP and DAGs are reliable indicators of freshness or the presence of refined olive oil. Seven (39%) of the of California extra virgin olive oils tested failed PPP and only one failed DAGs, despite the fact that only one sample failed an IOC purity measure related to the presence of refined olive oil (and that sample passed DAGs).

Secondly, the test results support the global industry’s position that relaxing of purity standards in the OOCC standards to meet the characteristics of California olive oils is unjustified. All eighteen of the California oils tested met the IOC purity standards which were eliminated from the OOCC standard, despite the OOCC's claim that California-produced olive oils have difficulty meeting these IOC purity limits.

Finally, the results raise questions about enforcement of the new OOCC standards. When the NAOOA's random testing reveals a deviation from industry norms, the NAOOA's standard practice is to notify the brand owners and share the full results including purchase information and labeling comments; this notification is being done for the samples collected in this report which were out of spec with either IOC and/or OOCC standards. Testing from across the U.S. and Canada continues over time and repeat evidence of mislabeling or adulteration is reported to national and state authorities. In this sampling, 28% of the eighteen samples failed the IOC standards (including the optional K232 which is a measure of oxidation).

The NAOOA continues to support the enforcement of a uniform international standard for olive oils, including those produced in California. The IOC standard continues to be the benchmark for the industry because it is based on widespread scientific research which evolves regularly and ensures fair trade for a global product such as olive oil. Olive oil standards have come under intense scrutiny in recent years, especially by newer-producing countries such as Australia and the U.S. Many of the recommendations for change have been based on limited testing such as those in this report, and compare test results out of context of real-world scenarios, i.e., self-testing before distribution compared to off-the-shelf testing.

Many olive oil quality parameters are known to change over time. Standards must be adopted with the aim of maintaining quality while recognizing uncontrollable factors such as heat and light could have an effect along the supply chain, and promoting measures for authenticity that can be conclusively interpreted when testing off-the-shelf samples. In order to promote quality products and identify adulteration, it is critical for the industry to collaborate and compare information in a fair and realistic manner.

Appendix A

Interpreting Extra Virgin Olive Oil Test Results
According to International Olive Council Standards

Interpreting Test Results for Extra Virgin Olive Oil

Olive oil is a natural product exhibiting a range of variable measures based on olive variety and growing region. Measures may also be affected during bottling and handling. The interpretations presented here should be considered general guidelines.

		Measure	IOC Limit	Checks For
Purity and Adulteration	Fatty Acid Profile	Myristic acid (C14:0)	≤ 0.03	Seed oil contamination
		Palmitic acid (C16:0)	7.5 - 20.0	
		Pamitoleic acid (C16:1)	0.3 - 3.5	
		Heptadecanoic acid (C17:0)	≤ 0.3	
		Heptadecenoic acid (C17:1)	≤ 0.3	
		Stearic acid (C18:0)	0.5 - 5.0	
		Oleic acid (C18:1)	55.0 - 83.0	
		Linoleic acid (C18:2)	2.5 - 21.0	
		Linolenic acid (C18:3)	≤ 1.0	
		Arachidic acid (C20:0)	≤ 0.6	
		Gadoleic acid (eicosenoic) (C20:1)	≤ 0.4	
		Behenic acid (C22:0)	≤ 0.2	
		Lignoceric acid (C24:0)	≤ 0.2	
	Trans Fatty Acids Content	C18:1 T %	≤ 0.05	Evidence of refined oil
		C18:2 T + C18:3 T %	≤ 0.05	
	Sterols Content (%)	Cholesterol	≤ 0.5	Seed oils or anim fat
		Brassicasterol	≤ 0.1	Seed oil contamination
		Campesterol	≤ 4.0 or ≤ 4.5*	
		Stigmasterol	< campesterol	
		Delta-7-stigmastenol	≤ 0.5 or ≤ 0.8**	
		Apparent beta-sitosterol (sum of six measures)	≥ 93.0	
	Total Sterols	Total sterol content (mg/kg)	≥ 1,000	
		Erythrodiol and uvaol content (% total sterols)	≤ 4.5	Solvent-extracted oils (olive-pomace oil)
	Wax Content	C42 + C44 + C46 (mg/kg)	≤ 150	
	Triglycerides	ECN 42 triacylglycerol	$\le \lvert 0.2 \rvert$	Seed oil contamination
	Hydrocarbons	Stigmastadiene content	≤ 0.05	Evidence of refined oil
	Fatty Acid in 2-position of triglycerides	2-glyceryl monopalmitate (C:16:0 ≤ 14.0%)	2P ≤ 0.9%	Evidence of re-esterified oils
		2-glyceryl monopalmitate (C:16:0 > 14.0%)	2P ≤ 1.0%	

*If campesterol is between 4.0 and 4.5, it can be EVOO if Stigmasterol is ≤ 1.4% and Δ-7 stigmastenol is ≤ 0.3%

**If Δ-7-stigmasterol is between 0.5 and 0.8, it can be EVOO if Campesterol is ≤ 3.3%; Apparent B-sitosterol / (campesterol + Δ7stig) ≥ 25; Stigmasterol is ≤ 1.4%; and ΔECN 42 is $\le \lvert 0.1 \rvert$

***If K270 and Delta K are above limits, other measures related to refined oil presence might be checked to confirm purity.

		Measure	IOC Limit	Checks For
Quality & Grade Level	Flavor	Sensory assessment Carried out by an IOC-certified panel of at least 8 tasters	defects = 0 fruity > 0	Taste defects may be due to fruit quality or handling; Rancidity will develop in oil over time and with exposure to heat, light and air
	Free fatty acids	Free acidity (oleic acid) %	≤ 0.8	Fruit quality & processing care; Shelf life - lower is better
	Oxidized Compounds (Peroxides)	Peroxide value	≤ 20	Primary oxidation; Shelf life - lower is better; May change over time and with exposure to heat, light and air
	Absorbency in Ultraviolet	K270	≤ 0.22***	Oxidation - bad processing; may increase over time and with exposure to heat, light and air
		(Delta) Δ K	≤ 0.01***	Oxidation - bad processing;
		K232 (optional)	≤ 2.50	Oxidation and rancidity; Increases over time and with exposure to heat, light and air
	Alkyl Esters	Fatty acid ethyl esters (FAEEs)	≤ 35 mg/kg	Oil quality; Shelf life - lower is better

***If K270 and Delta K are above limits, other measures related to refined oil presence might be checked to confirm purity.

Appendix B

Test Results of California Extra Virgin Olive Oils

				PPP		1,2 DAG		FFA			Peroxide			K232		
Sample	**2015 Purchase Date**	**Best By Date**	**Harvest**	**Result**	**OOCC ≤ 17**	**Result**	**OOCC ≥ 35**	**Result**	**OOCC ≤ 0.5**	**IOC ≤ 0.8**	**Result**	**OOCC ≤ 15**	**IOC ≤ 20**	**Result**	**OOCC ≤ 2.4**	**IOC ≤ 2.5**
1298*	March 12	July 2016	2014	17	at limit	47.2	Pass	0.28	Pass	Pass	9.8	Pass	Pass	1.61	Pass	Pass
1262*	January 10		2014	13.4	Pass	40	Pass	0.33	Pass	Pass	27.7	Fail	Fail	4.34	Fail	Fail
1264*	January 10	April 15 2016		21.4	Fail	43.1	Pass	0.23	Pass	Pass	11.2	Pass	Pass	1.75	Pass	Pass
1266*	January 10	Feb 3 2016		28.8	Fail	39.5	Pass	0.23	Pass	Pass	8.9	Pass	Pass	1.81	Pass	Pass
1263*	January 10		Nov 2013	12.5	Pass	50.1	Pass	0.20	Pass	Pass	11.4	Pass	Pass	1.93	Pass	Pass
1265*	January 10	June 24 2016	2014	19.4	Fail	43.5	Pass	0.26	Pass	Pass	9.8	Pass	Pass	1.6	Pass	Pass
1267*	January 10	Nov 11 2016	Nov 2013	12	Pass	49.2	Pass	0.24	Pass	Pass	9.9	Pass	Pass	1.69	Pass	Pass
1268*	January 10		Nov 2013	10	Pass	38.9	Pass	0.39	Pass	Pass	17.5	Fail	Pass	2.65	Fail	Fail
1269*	January 10			48.7	Fail	38.4	Pass	0.22	Pass	Pass	20.1	Fail	Fail	3.02	Fail	Fail
1270*	January 10		Autumn 2013	7.4	Pass	78.7	Pass	0.14	Pass	Pass	11.1	Pass	Pass	2.02	Pass	Pass
1271	January 10			11.9	Pass	48.7	Pass	0.26	Pass	Pass	10.9	Pass	Pass	1.65	Pass	Pass
1272	January 10			12.4	Pass	47.4	Pass	0.26	Pass	Pass	11.9	Pass	Pass	1.63	Pass	Pass
1273*	January 10		December	14.2	Pass	50.3	Pass	0.22	Pass	Pass	15.4	Fail	Pass	2.37	Pass	Pass
1274*	January 10		2014	12.5	Pass	48.6	Pass	0.26	Pass	Pass	13.8	Pass	Pass	2.57	Fail	Fail
1275*	January 10		2014	13.4	Pass	33.8	Fail	0.56	Fail	Pass	15.1	Fail	Pass	2.65	Fail	Fail
1277	January 10			49.3	Fail	37.8	Pass	0.21	Pass	Pass	7.9	Pass	Pass	1.85	Pass	Pass
1278	January 17	Sept 3 2016		18.1	Fail	46.2	Pass	0.24	Pass	Pass	8.0	Pass	Pass	1.69	Pass	Pass
1302	March 13	July 24 2015		26.1	Fail	42.1	Pass	0.23	Pass	Pass	9.5	Pass	Pass	1.8	Pass	Pass

California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

	K270			Δ K			2-glyceryl monopalmitate**			Total Sterol Content			Wax Content***			Trans Fatty Acid Content (C18:1 T %)		
Sample	**Result**	**OOCC ≤ 0.22**	**IOC ≤ 0.22**	**Result**	**OOCC ≤ 0.01**	**IOC ≤ 0.01**	**Result**	**OOCC N/A**	**IOC ****	**Result**	**OOCC N/A**	**IOC ≥ 1,000**	**Result**	**OOCC ≤ 250**	**IOC ≤ 150**	**Result**	**OOCC ≤ 0.05**	**IOC ≤ 0.05**
1298*	0.14	Pass	Pass	-0.002	Pass	Pass	0.7		Pass	1434		Pass	86.7	Pass	Pass	0.01	Pass	Pass
1262*	0.28	Fail	Fail	0.002	Pass	Pass	0.9		Pass	1806		Pass	99.4	Pass	Pass	0.02	Pass	Pass
1264*	0.14	Pass	Pass	0.000	Pass	Pass	0.8		Pass	1563		Pass	88.8	Pass	Pass	0.02	Pass	Pass
1266*	0.17	Pass	Pass	0.003	Pass	Pass	0.8		Pass	1374		Pass	90.9	Pass	Pass	0.02	Pass	Pass
1263*	0.13	Pass	Pass	0.001	Pass	Pass	0.7		Pass	1632		Pass	78.3	Pass	Pass	0.01	Pass	Pass
1265*	0.16	Pass	Pass	-0.001	Pass	Pass	0.7		Pass	1735		Pass	63.6	Pass	Pass	0.02	Pass	Pass
1267*	0.14	Pass	Pass	0.000	Pass	Pass	0.8		Pass	1602		Pass	75.9	Pass	Pass	0.01	Pass	Pass
1268*	0.16	Pass	Pass	0.000	Pass	Pass	0.6		Pass	1489		Pass	56.1	Pass	Pass	0.01	Pass	Pass
1269*	0.27	Fail	Fail	0.02	Fail	Fail	0.8		Pass	1601		Pass	79.9	Pass	Pass	0.02	Pass	Pass
1270*	0.17	Pass	Pass	-0.001	Pass	Pass	0.6		Pass	1327		Pass	39.5	Pass	Pass	0.02	Pass	Pass
1271	0.13	Pass	Pass	-0.001	Pass	Pass	0.7		Pass	1624		Pass	75.2	Pass	Pass	0.01	Pass	Pass
1272	0.14	Pass	Pass	-0.001	Pass	Pass	0.5		Pass	1101		Pass	63.1	Pass	Pass	0.01	Pass	Pass
1273*	0.19	Pass	Pass	-0.001	Pass	Pass	0.7		Pass	1417		Pass	59.8	Pass	Pass	0.02	Pass	Pass
1274*	0.17	Pass	Pass	0.000	Pass	Pass	0.7		Pass	1503		Pass	46.4	Pass	Pass	0.03	Pass	Pass
1275*	0.17	Pass	Pass	0.001	Pass	Pass	0.6		Pass	1693		Pass	48.2	Pass	Pass	0.02	Pass	Pass
1277	0.18	Pass	Pass	0.003	Pass	Pass	0.6		Pass	2048		Pass	37.6	Pass	Pass	0.01	Pass	Pass
1278	0.13	Pass	Pass	0.001	Pass	Pass	0.7		Pass	1370		Pass	78.5	Pass	Pass	0.01	Pass	Pass
1302	0.15	Pass	Pass	0.004	Pass	Pass	0.7		Pass	1531		Pass	85.5	Pass	Pass	0.02	Pass	Pass

****California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online***

***** Either(C:16:0 ≤ 14.0%) limit 2P ≤ 0.9% OR (C:16:0 > 14.0%) limit 2P ≤ 1.0%***

****** IOC = C42+C44+C46 while OOCC = C40+C42+C44+C46; Results here are IOC sums***

	Trans Fatty Acid Content (C18:2 T + C18:3 T %)			Max Difference ECN 42 triacylglycerol			Stigmastadienes			Myristic Acid (C14:0)			Palmitic Acid (C16:0)			Palmitoleic Acid (C16:1)		
Sample	Result	OOCC ≤ 0.05	IOC ≤ 0.05	Result	OOCC ≤ |0.2|	IOC ≤ |0.2|	Result	OOCC ≤ 0.10	IOC ≤ 0.05	Result	OOCC ≤ 0.05	IOC ≤ 0.03	Result	OOCC N/A	IOC 7.5 - 20.0	Result	OOCC N/A	IOC 0.3 - 3.5
1298*	0.01	Pass	Pass	0.00	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	14.9		Pass	1.5		Pass
1262*	0.02	Pass	Pass	0.00	Pass	Pass	< 0.01	Pass	Pass	0.02	Pass	Pass	16.5		Pass	1.7		Pass
1264*	0.02	Pass	Pass	0.02	Pass	Pass	< 0.01	Pass	Pass	0.02	Pass	Pass	15.6		Pass	1.8		Pass
1266*	0.02	Pass	Pass	0.04	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	14.8		Pass	1.4		Pass
1263*	0.01	Pass	Pass	0.03	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	14.5		Pass	1.5		Pass
1265*	0.01	Pass	Pass	0.01	Pass	Pass	< 0.01	Pass	Pass	0.01	Pass	Pass	14.9		Pass	1.6		Pass
1267*	0.01	Pass	Pass	0.00	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	14.5		Pass	1.4		Pass
1268*	0.01	Pass	Pass	0.01	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	12.9		Pass	1.1		Pass
1269*	0.02	Pass	Pass	0.06	Pass	Pass	0.14	Fail	Fail	0.02	Pass	Pass	14.5		Pass	1.4		Pass
1270*	0.01	Pass	Pass	0.01	Pass	Pass	ND	Pass	Pass	0.01	Pass	Pass	11.5		Pass	0.7		Pass
1271	0.02	Pass	Pass	0.00	Pass	Pass	0.02	Pass	Pass	0.01	Pass	Pass	14.6		Pass	1.4		Pass
1272	0.01	Pass	Pass	0.05	Pass	Pass	0.02	Pass	Pass	0.01	Pass	Pass	11.6		Pass	0.8		Pass
1273*	0.01	Pass	Pass	0.00	Pass	Pass	0.03	Pass	Pass	0.01	Pass	Pass	13.7		Pass	1.3		Pass
1274*	0.02	Pass	Pass	0.03	Pass	Pass	0.01	Pass	Pass	0.01	Pass	Pass	13.5		Pass	1.3		Pass
1275*	0.02	Pass	Pass	0.01	Pass	Pass	0.02	Pass	Pass	0.02	Pass	Pass	13.1		Pass	1.3		Pass
1277	0.01	Pass	Pass	0.05	Pass	Pass	ND	Pass	Pass	0.02	Pass	Pass	10.1		Pass	0.8		Pass
1278	0.02	Pass	Pass	0.04	Pass	Pass	< 0.01	Pass	Pass	0.01	Pass	Pass	14.9		Pass	1.6		Pass
1302	0.02	Pass	Pass	0.02	Pass	Pass	0.05	Pass	at limit	0.01	Pass	Pass	14.4		Pass	1.4		Pass

California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

	Heptadecanoic Acid (C17:0)			Heptadecenoic Acid (C17:1)			Stearic Acid (C18:0)			Oleic Acid (C18:1)			Linoleic Acid (C18:2)			Linolenic Acid (C18:3)		
Sample	Result	OOCC ≤ 0.3	IOC ≤ 0.3	Result	OOCC N/A	IOC ≤ 0.3	Result	OOCC 0.5 - 5.0	IOC 0.5 - 5.0	Result	OOCC N/A	IOC 55 - 83	Result	OOCC N/A	IOC 2.5 - 21.0	Result	OOCC N/A	IOC ≤ 1.0
1298*	0.1	Pass	Pass	0.3		Pass	2.2	Pass	Pass	70.6		Pass	8.9		Pass	0.6		Pass
1262*	0.2	Pass	Pass	0.3		Pass	2.0	Pass	Pass	67.7		Pass	10.0		Pass	0.7		Pass
1264*	0.1	Pass	Pass	0.3		Pass	1.9	Pass	Pass	67.3		Pass	11.5		Pass	0.6		Pass
1266*	0.1	Pass	Pass	0.3		Pass	2.0	Pass	Pass	70.1		Pass	9.8		Pass	0.6		Pass
1263*	0.1	Pass	Pass	0.3		Pass	1.9	Pass	Pass	69.6		Pass	10.6		Pass	0.6		Pass
1265*	0.2	Pass	Pass	0.3		Pass	2.3	Pass	Pass	71.2		Pass	7.8		Pass	0.7		Pass
1267*	0.1	Pass	Pass	0.3		Pass	2.1	Pass	Pass	71.0		Pass	9.1		Pass	0.6		Pass
1268*	ND	Pass	Pass	0.1		Pass	2.5	Pass	Pass	71.7		Pass	10.2		Pass	0.6		Pass
1269*	0.1	Pass	Pass	0.3		Pass	1.9	Pass	Pass	69.7		Pass	10.6		Pass	0.6		Pass
1270*	0.1	Pass	Pass	0.1		Pass	2.5	Pass	Pass	75.6		Pass	7.9		Pass	0.7		Pass
1271	0.1	Pass	Pass	0.3		Pass	2.1	Pass	Pass	70.9		Pass	9.1		Pass	0.6		Pass
1272	0.1	Pass	Pass	0.1		Pass	2.5	Pass	Pass	77.3		Pass	5.9		Pass	0.6		Pass
1273*	0.1	Pass	Pass	0.2		Pass	2.5	Pass	Pass	71.7		Pass	9.0		Pass	0.6		Pass
1274*	0.1	Pass	Pass	0.1		Pass	2.4	Pass	Pass	70.8		Pass	10.2		Pass	0.7		Pass
1275*	0.1	Pass	Pass	0.3		Pass	2.2	Pass	Pass	70.2		Pass	11.0		Pass	0.8		Pass
1277	ND	Pass	Pass	0.1		Pass	2.2	Pass	Pass	76.8		Pass	8.2		Pass	1.0		Pass
1278	0.1	Pass	Pass	0.2		Pass	2.0	Pass	Pass	69.1		Pass	10.6		Pass	0.6		Pass
1302	0.1	Pass	Pass	0.3		Pass	1.9	Pass	Pass	70.4		Pass	10.0		Pass	0.6		Pass

California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

	Arachidic Acid (C20:0)			Gadoleic Acid (eicosenoic) (C20:1)			Behenic Acid (C22:0)			Lignoceric Acid (C24:0)			Cholesterol			Campesterol****		
Sample	Result	OOCC ≤ 0.6	IOC ≤ 0.6	Result	OOCC N/A	IOC ≤ 0.4	Result	OOCC ≤ 0.2	IOC ≤ 0.2	Result	OOCC ≤ 0.2	IOC ≤ 0.2	Result	OOCC N/A	IOC ≤ 0.5	Result	OOCC N/A	IOC ≤ 4.0 or ≤ 4.5
1298*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.7		Pass
1262*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	4.0		Pass
1264*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.6		Pass
1266*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.8		Pass
1263*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.6		Pass
1265*	0.4	Pass	Pass	0.3		Pass	0.2	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.7		Pass
1267*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.9		Pass
1268*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.0		Pass
1269*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.8		Pass
1270*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.3		Pass
1271	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.9		Pass
1272	0.5	Pass	Pass	0.3		Pass	0.2	Pass	Pass	0.1	Pass	Pass	0.1		Pass	4.4		Pass
1273*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.4		Pass
1274*	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.0		Pass
1275*	0.4	Pass	Pass	0.4		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.1		Pass
1277	0.3	Pass	Pass	0.4		Pass	0.1	Pass	Pass	ND	Pass	Pass	0.1		Pass	2.9		Pass
1278	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	3.6		Pass
1302	0.4	Pass	Pass	0.3		Pass	0.1	Pass	Pass	0.1	Pass	Pass	0.1		Pass	4.0		Pass

*California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

****If campesterol is between 4.0 and 4.5, it can be EVOO if Stigmasterol is ≤ 1.4% and Δ-7 stigmastenol is ≤ 0.3%

	Brassicasterol			Apparent β-sitosterol			Stigmasterol			Erythrodiol & Uvaol Content			Δ 7 stigmastenol *****		
Sample	Result	OOCC ≤ 0.1	IOC ≤ 0.1	Result	OOCC N/A	IOC ≥ 93	Result	OOCC ≤ 1.9	IOC ≤ campesterol	Result	OOCC N/A	IOC ≤ 4.5	Result	OOCC N/A	IOC ≤ 0.5 or ≤ 0.8
1298*	ND	Pass	Pass	94.2		Pass	0.8	Pass	Pass	2.5		Pass	0.2		Pass
1262*	ND	Pass	Pass	93.6		Pass	1.0	Pass	Pass	2.2		Pass	0.4		Pass
1264*	ND	Pass	Pass	94.2		Pass	0.9	Pass	Pass	2.7		Pass	0.3		Pass
1266*	ND	Pass	Pass	94.0		Pass	0.9	Pass	Pass	2.5		Pass	0.3		Pass
1263*	ND	Pass	Pass	94.3		Pass	0.7	Pass	Pass	1.9		Pass	0.2		Pass
1265*	ND	Pass	Pass	94.4		Pass	0.8	Pass	Pass	3.0		Pass	0.2		Pass
1267*	ND	Pass	Pass	94.1		Pass	0.8	Pass	Pass	2.5		Pass	0.2		Pass
1268*	ND	Pass	Pass	94.7		Pass	0.5	Pass	Pass	1.1		Pass	0.5		Pass
1269*	ND	Pass	Pass	94.1		Pass	0.9	Pass	Pass	2.6		Pass	0.2		Pass
1270*	ND	Pass	Pass	94.1		Pass	0.6	Pass	Pass	1.9		Pass	0.4		Pass
1271	ND	Pass	Pass	94.2		Pass	0.8	Pass	Pass	2.7		Pass	0.2		Pass
1272	ND	Pass	Pass	93.8		Pass	0.6	Pass	Pass	3.3		Pass	0.2		Pass
1273*	ND	Pass	Pass	94.0		Pass	0.8	Pass	Pass	2.1		Pass	0.4		Pass
1274*	ND	Pass	Pass	94.9		Pass	0.6	Pass	Pass	1.3		Pass	0.3		Pass
1275*	ND	Pass	Pass	95.0		Pass	1.0	Pass	Pass	1.2		Pass	0.1		Pass
1277	ND	Pass	Pass	95.8		Pass	0.6	Pass	Pass	1.2		Pass	0.1		Pass
1278	ND	Pass	Pass	94.3		Pass	0.8	Pass	Pass	1.9		Pass	0.2		Pass
1302	0.1	Pass	Pass	94.0		Pass	0.8	Pass	Pass	2.0		Pass	0.1		Pass

California Olive Oil Council (COOC) Certified Extra Virgin Seal on label and/or online

*****If Δ-7-stigmasterol is between 0.5 and 0.8, it can be EVOO if Campesterol is ≤ 3.3%; Apparent Β-sitosterol / (campesterol + Δ7stig) ≥ 25; Stigmasterol is ≤ 1.4%; and ΔECN 42 is ≤ |0.1|***