

# Lime Soaps in Olive Oil Foots

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**S**INCE Sulphur Oil or Olive Oil Foots is the residual oil in the pulp, from which it is extracted by carbon bisulphide after the commercial and edible oils are pressed out, it follows that no rigid specifications are drawn for this oil as in the case of other oils. Moisture, impurities insoluble in carbon bisulphide or ether, and soap color are the general determining values of its quality.

The matter of soap color has already been discussed in an article by Trevithick and Dickhart (*JOURNAL OF OIL & FAT INDUSTRIES*, April 1926), as also moisture and oil containing excessive stearine, by Trevithick and Lauro of this Bureau (*Ibid*, March, 1926).

Regarding impurities other than the usual dirt, fiber or foreign matter insoluble in carbon bisulphide or ether, we may consider the presence of metallic soaps, dyes or added coloring matter, ash and unsaponifiable in excess of normal, as matters worth looking into, in special cases.

Recently a few shipments of foots have presented instances rather puzzling at first to the merchant in that the usual chemical certificate of analysis revealed no sign of the presence of any abnormality in the quality of the foots. The test for impurities showed a content of insoluble in the hundredths of one per cent. And yet, upon further examination, there was found as much as 30 per cent of lime soaps in the oil. This is possible, because under the conditions of

the solubility tests, lime soaps will escape detection, they being completely soluble in warm ether or carbon bisulphide. Upon standing in cold ether, the bulk of the soap will settle out of solution as a white amorphous powder, which again dissolves on warming. Cold carbon bisulphide, however, does not appear to throw down any of this soap.

The appearance of the foots was not unlike those from which the more liquid portions had been removed and which therefore contained excessive stearine, and analyzed with iodine values of 60 to 66 and titers of 35° to 39°C. The consistency is thick and jelly-like at a temperature 75° to 84° F. when the usual condition of olive oil foots at this temperature is practically liquid. This slime-like character of the foots gave cause for suspicion and led to its re-examination along lines not directly routine.

As to how the lime soaps came to be in the foots is problematical, since a chemist is without the necessary knowledge of its history. It may, however, have come through the use of lime in reducing the acidity of the last commercial oil pressed from the marc and thus found its way by extraction with carbon bisulphide into the foots. At times, pulp is allowed to ferment in cement-lined cisterns or wells for a time; or the foots are stored in such tanks. The high acid content reacting with the lime may dissolve and incorporate a por-

tion of it as metallic soap. It is not likely, however, that the large content of lime soap in the oils examined could come from this source.

The merchant would therefore do well to demand additional analysis to the customary "M. I. and Soap Color," when the appearance of the sample is such as to arouse suspicion. For whether the foots contain an excess of stearine and otherwise are normal; or whether they contain lime soaps, irrespective of the question of delivery being a proper one; or not; as normal olive oil foots, such shipments will no doubt meet with grave objections on the part of the textile soap maker. In the first case, he will find it difficult to saponify harder oil, since his equipment and process are elementary in nature. In the second case, the presence of the lime clots the soap in the making, preventing it from "closing" to a smooth finish.

Lime is objectionable in the waters used in the dyeing of silk goods, since the deposition of lime soap upon the cloth makes for unequal dyeing later. The finished goods will show a "patching" effect when held to the light. Lime previously contained in soap to be used in washing textiles is therefore distinctly undesired.

From the analytical standpoint, metallic soaps can be detected by ashing the sample and testing this for the presence of metal. The normal ash content of foots is around 0.15 per cent. It is very light and fluffy in appearance and reddish or rust-like in character, since the chief impurity in the ash is iron oxide. The amount of ash multiplied by ten would give a rough approximation of the metallic soap present, which may be ob-

tained accurately in another way.

The foots may be boiled with hydrochloric acid to break up the lime soaps, and after washing to remove the mineral acid, may be titrated for total acidity. This would, therefore, include the acid on the original oil and that resulting from the soap by the hydrochloric acid treatment. The free fatty acid content is determined on a separate sample of the original foots and is subtracted from the above figure giving the percentage of acidity due to the metallic soap. The ash content added to this amount of fatty acid will give the quantity of metallic soap present (chiefly, lime soaps).

Or, as suggested by H. P. Trevithick, the moisture and impurities are subtracted from one-hundred per cent, thus giving the percentage of total oil present in the sample. The sum of free fatty acid and neutral oil taken from this figure gives the percentage of lime soap present by difference.

*Analysis of two lots of oil containing lime soaps:*

	M. F. Lauro	W. H. Dickhart
Moisture . . . . .	5.00%	4.90%
Impurities . . . . .	0.16%	0.16%
Soap Color . . . . .	Prime Green (Good)	Prime Green (Poor)
Unsaponifiable		
Matter . . . . .	2.20%	1.96%
Ash . . . . .	3.21%	3.63%
Iodine No. . . . .	86.9	85.2
Saponifiable No. . . . .	191.5	190.3
Free Fatty Acid. . . . .	52.00%	55.00%
Free Oil . . . . .	8.00%	7.9 %
Metallic Soaps (by difference) Lime, Iron, etc. . . . .	31.6 %	28.4 %

The iodine and saponification values are as above, when calculated to pure oil, and are free of soap, water and impurities; show-

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**Domestic Exports of Lard Compounds and Oleomargarine from the United States During November**

Countries	Lard compounds containing animal fats		Oleomargarine of animal or vegetable fats		Vegetable oil lard and compounds	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Belgium .....	2,160	536	.....	.....	.....	.....
France .....	.....	.....	.....	.....	10,378	2,200
Germany .....	.....	.....	.....	.....	48	11
Greece .....	19,151	2,298	.....	.....	36	8
Italy .....	.....	.....	.....	.....	13,018	1,730
Netherlands .....	.....	.....	125,058	13,938	.....	.....
Norway .....	298,756	37,403	.....	.....	5,500	600
United Kingdom .....	117,790	14,776	.....	.....	47,373	5,184
Canada .....	7,360	1,007	31,507	2,886	69,882	10,218
B. Honduras .....	21,828	2,640	50	12	412	56
Costa Rica .....	.....	.....	112	26	1,524	264
Guatemala .....	.....	.....	.....	.....	11,243	1,760
Honduras .....	900	127	.....	.....	4,796	807
Nicaragua .....	3,344	414	.....	.....	1,079	180
Panama .....	25,802	3,333	24,040	4,334	9,113	1,405
Salvador .....	932	164	.....	.....	100	19
Mexico .....	87,685	10,577	150	35	216,425	23,887
Newfoundland and Labrador .....	78,243	9,076	.....	.....	17,898	2,166
Bermuda .....	1,750	279	180	36	1,198	238
Jamaica .....	1,620	206	.....	.....	3,460	575
Trinidad and Tobago .....	3,100	491	.....	.....	2,250	473
Other B. W. Indies .....	23,194	2,592	10,455	2,035	29,303	3,589
Cuba .....	325,026	37,818	1,200	256	316,177	36,865
Dominican Rep. ....	.....	.....	180	33	360	78
D. W. Indies .....	14,075	2,058	142	29	790	80
F. W. Indies .....	750	105	.....	.....	.....	.....
Haitian Republic .....	22,725	3,456	13,000	2,411	800	144
Virgin Is. of U. S. ....	24,670	3,278	8,368	1,594	34,028	3,428
Bolivia .....	7,000	910	.....	.....	.....	.....
Chile .....	94,570	13,382	.....	.....	24,285	3,412
Colombia .....	.....	.....	.....	.....	990	183
Ecuador .....	8,755	1,532	.....	.....	65,424	9,829
Peru .....	.....	.....	.....	.....	194	37
Venezuela .....	4,070	610	.....	.....	1,608	346
B. India .....	.....	.....	.....	.....	10,000	1,300
B. Malaya .....	.....	.....	.....	.....	785	206
China .....	72	18	.....	.....	13,756	3,375
Hongkong .....	.....	.....	.....	.....	180	40
Japan, inc. Chosen .....	.....	.....	.....	.....	3,788	638
Philippine Is. ....	1,550	6,936	.....	.....	7,209	1,567
Syria .....	368	40	.....	.....	.....	.....
French Oceania .....	96	14	.....	.....	182	22
N. Zealand .....	.....	.....	.....	.....	2,500	350
B. W. Africa .....	4,240	710	.....	.....	.....	.....
Other F. Africa .....	100	21	.....	.....	.....	.....
<b>Total .....</b>	<b>1,241,682</b>	<b>156,807</b>	<b>214,442</b>	<b>27,625</b>	<b>928,092</b>	<b>117,270</b>

Shipments from the United States to Non-Contiguous Territories.

Non-contiguous territories	Lard compounds containing animal fats
Alaska .....	11,720
Hawaii .....	88,457
Porto Rico .....	90,023

**Domestic Exports of Oleo Oil, Tallow, Oleic Acid or Red Oil, and Other Animal Greases, Oils and Fats, N. E. S., from the United States, During November**

Countries	Oleo oil Pounds	Tallow Pounds	Oleic acid or red oil Pounds	Other animal greases, oils and fats n. e. s. Pounds
Belgium	146,667	59,008	.....	1,226,956
Denmark and Faroe Is.	309,206	.....	.....	.....
Finland	15,405	.....	.....	.....
France	.....	.....	.....	37,664
Germany	1,327,143	32,520	.....	52,277
Gibraltar	.....	365	.....	.....
Greece	500,323	.....	.....	.....
Italy	94,060	.....	.....	94,035
Latvia	.....	77,251	.....	50,968
Netherlands	2,050,848	172,626	.....	3,391,402
Norway	368,091	3,800	.....	62,150
Sweden	66,424	.....	.....	2,020
Switzerland	80,869	.....	.....	.....
United Kingdom	2,028,765	.....	.....	216,828
Canada	14,600	176,964	5,712	1,362,194
Costa Rica	.....	.....	1,599	20,800
Guatemala	.....	22,420	.....	4,000
Honduras	.....	136,259	.....	59,111
Nicaragua	.....	8,000	.....	32,000
Salvador	.....	.....	.....	16,400
Mexico	11,242	137,157	4,087	161,067
Newfoundland and Labrador	236,900	1,195	.....	.....
Bermuda	.....	.....	.....	267
Trinidad and Tobago	.....	624	.....	.....
Cuba	159,390	45,234	.....	774,486
Dominican Republic	.....	194,450	2,034	45,939
Haitian Republic	.....	1,400	.....	.....
Colombia	479	94,339	3,119	24,300
D. Guiana	.....	10,238	.....	.....
Peru	5,056	376	.....	.....
Japan inc. Chosen	13,455	17,411	.....	.....
Philippine Is.	.....	4,366	.....	.....
Syria	57,338	.....	.....	.....
Australia	1,860	.....	.....	.....
F. Oceania	.....	.....	.....	300
B. S. Africa	.....	.....	.....	170
Egypt	9,441	.....	.....	.....
Quantity	7,497,600	1,196,003	16,551	7,635,334
Total Value	840,172	102,315	1,874	718,857

**Wesson Oil Barometer**

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basis, Wesson Oil has placed on the market all of its treasury stock, both preferred and common, the proceeds of which will be utilized in expanding its manufacturing facilities. This indicates that in the judgment of the directors of the

company the outlook for the cotton oil business appears undisturbed and that conditions at the present time warrant those engaged in this business proceeding aggressively and with confidence in laying out their plans for the future.

**Imports of Olives, Coconut Meat and Coconut Oil, Into the United States During  
December**

Countries	Olives in brine		Coconut meat dessi- cated, shredded, cut or similarly prepared	
	Gallons	Dollars	Pounds	Dollars
France .....	23	31	.....	.....
Greece .....	7,326	4,894	.....	.....
Italy .....	19,079	6,765	.....	.....
Portugal .....	9,996	11,028	.....	.....
Spain .....	230,124	180,254	.....	.....
Canada .....	2	6	.....	.....
Panama .....	.....	.....	.....	.....
Jamaica .....	.....	.....	.....	.....
Dominican Rep. ....	.....	.....	.....	.....
Br. Malaya .....	.....	.....	.....	.....
Br. India .....	.....	.....	.....	.....
China .....	48	32	.....	.....
Hongkong .....	172	114	65,040	4,770
Palestine .....	369	165	.....	.....
Philippine Islands ..	.....	.....	2,290,888	207,528
Syria .....	967	538	.....	.....
Br. Oceania .....	.....	.....	.....	.....
Fr. Oceania .....	.....	.....	.....	.....
Ceylon .....	.....	.....	2,372,820	217,303
<b>Total</b> .....	<b>268,106</b>	<b>203,827</b>	<b>4,728,748</b>	<b>429,601</b>

	Copra		Coconut oil	
	Pounds	Dollars	Pounds	Dollars
France .....	.....	.....	.....	.....
Greece .....	.....	.....	.....	.....
Italy .....	.....	.....	.....	.....
Portugal .....	.....	.....	.....	.....
Spain .....	.....	.....	.....	.....
Canada .....	17,483	844	.....	.....
Panama .....	2,900	147	.....	.....
Jamaica .....	6,148	255	.....	.....
Dominican Rep. ....	.....	.....	100	21
Br. Malaya .....	2,251,715	108,433	.....	.....
Br. India .....	.....	.....	44,682	4,585
China .....	.....	.....	.....	.....
Hongkong .....	.....	.....	.....	.....
Palestine .....	.....	.....	.....	.....
Philippine Islands ..	32,997,489	1,560,307	25,399,715	2,063,500
Syria .....	.....	.....	.....	.....
Br. Oceania .....	962,892	46,070	.....	.....
Fr. Oceania .....	3,792,843	186,396	.....	.....
Ceylon .....	.....	.....	.....	.....
<b>Total</b> .....	<b>40,031,470</b>	<b>1,902,452</b>	<b>25,444,497</b>	<b>2,068,106</b>

**Imports of Peanuts, Peanut Oil, and Edible Olive Oil Into the United States  
During December**

**PEANUTS**

Countries	Shelled		Not shelled		Peanut oil	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
France .....					110,346	11,647
Germany .....	89,469	7,345				
Netherlands .....					17,567	2,082
Spain .....			10,913	919		
Canada .....	4,800	420				
D. W. Indies .....			770	48		
China .....	43,100	3,073	50,120	1,924	3,960	480
Hongkong .....	2,880	316	7,020	875	124,026	14,194
Japan, including C....	200	13	11,600	772		
<b>Total .....</b>	<b>140,449</b>	<b>11,167</b>	<b>80,423</b>	<b>4,538</b>	<b>255,899</b>	<b>28,403</b>

**EDIBLE OLIVE OIL**

Countries	In packages weighing less than 40 pounds		Other	
	Pounds	Dollars	Pounds	Dollars
France .....	70,097	17,239	176,138	38,273
Germany .....	30	11	366	70
Greece .....			8,134	1,454
Italy .....	1,892,186	380,253	506,659	108,316
Spain .....	144,341	27,051	853,114	174,224
Turkey in Europe .....			1,150	257
Canada .....	34	9		
Cuba .....	38	9		
Syria .....	83	6	240	39
Egypt .....			77,700	16,084
United Kingdom .....	7,950	1,712		
<b>Total .....</b>	<b>2,114,759</b>	<b>426,290</b>	<b>1,623,501</b>	<b>338,717</b>

**Refining Test Methods**

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ing the foots to be otherwise normal in all respects.

The lime soaps may be separated from the oil, if desired for further examination, by repeated precipitation from ethyl ether solution of the sample, in the cold; or from the insoluble material left after filtering and washing the diluted mixture of soaps obtained in the saponification of the sample

with alcoholic potash, the alcohol first being evaporated off.

Normal commercial olive oil foots analyze with an ash content .05 to .18 per cent, moisture and impurities usually under 3 per cent, free fatty acids up to 75 per cent or more, saponification value 188 to 195, iodine value (Wijs) 78 to 92, and unsaponifiable matter 1.20 to 3.00 per cent.