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Olive Oil: A "Rediscovered" California Crop

by

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Increasing demand for olive oil has encouraged many small California olive producers to concentrate on oil production for a high-quality, premium-price niche market. This market will remain small due to economic relationships. Ê

Growing U.S. demand for olive oil related to publicity concerning its health benefits, has led to increased imports and renewed interest in oil production by California olive producers. Many have entered value-added production of olive oil targeted to a premium-quality niche market, and marketing of boutique olive oil appears to have taken on some of the characteristics of boutique wines. Growing interest in olive oil production raises questions about its economic potential. This article examines some of the history and economics of olive and olive oil production in California with comparisons to Spain, the world's largest olive producer.

Industry Background

Early California olive production was for oil but the emphasis changed to production of table olives in the early 1900s with the advent of canning technology and higher returns for canned olives. Recently, 90 percent of California olive production has been canned, with ten percent crushed for oil. The roles are reversed in Spain and other Mediterranean countries, with about 90 percent of the crop crushed for oil and only about ten percent used for cured olive products.

Olives are an important California crop but the California olive industry is dwarfed by Spain's olive acreage and production. In 2002, the Census of Agriculture found that California had 39,591 acres of olives grown on 1,549 farms, while Spain had 5,662,139 acres of olives grown by 571,150 producers. Thus, the acreage devoted to olive production in Spain is over 140 times larger than in California.

Olive acreage per farm is relatively small in both California and Spain, with an average size of 25.55 and 9.91 acres, respectively. Spanish statistics classify 5,274,710 acres (93 percent) as designated for oil production and the remaining 387,691 acres (seven percent) for table olives. A recent California survey conducted by Vossen and Devarenne found 6,168 acres of olives for oil production (approximately 15.6 percent), which would leave about 33,423 acres (84.4 percent) for production of table olives (assuming that total acreage was constant between the 2002 Census and the Vossen and Devarenne survey). There are 528 California olive producers with an average of 14 acres of olives grown for oil.

The Spanish industry is oriented to dryland production (only about 13 percent of olive acreage is irrigated), with many groves planted on rolling hills with rocky soils that will produce few other crops. In contrast, California olive production is concentrated on level and productive irrigated land in the Central Valley. However, even the small percentage of irrigated olive acreage in Spain is over 736,000 acres.

Also in this issue.....

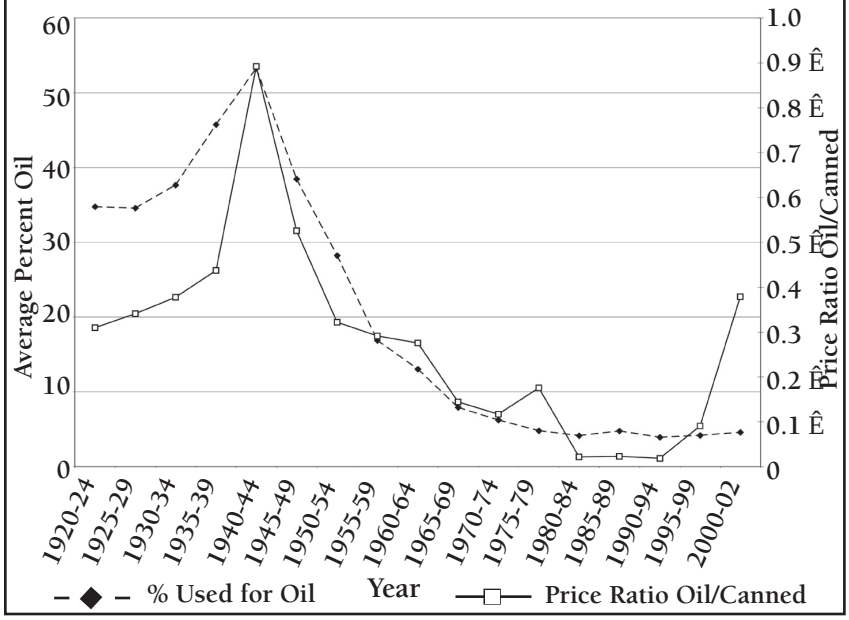
Average annual yields vary significantly between Spain and California as a result of differences in soil quality, irrigation, management practices and varieties, as well as the alternate bearing tendencies of olive trees. California olive production averaged 108,000 tons annually from 1999 through 2002, while Spanish production averaged 5,024,995 tons for the same period. Overall, average per acre Spanish yields are less than one-half of California's but, with its huge acreage, Spain's annual total olive production is more than 50 times larger than California's.

Production of Olive Oil in California

The annual utilization of the California olive crop is driven by economics, as shown by the close relationship between the proportion of the crop used for oil and relative returns from oil. Five-year averages of the proportion of California's annual olive crop crushed for oil and the ratio of prices of olives crushed to prices of olives canned are plotted in Figure 1 for 1920-2002. Note that the proportion of California's olive crop crushed for oil increased after 1920, peaking at an average of 53.3 percent during the World War II years of 1940-44. The prices that producers received for olives used for oil also increased relative to prices of olives canned during the same period, peaking at an average of 89 percent.

Average annual prices of olives used for oil dropped to $12 per ton in 1980 and remained in a range of $8 to $17 per ton through 1998. Note that prices reported were for cull table fruit through 1998. The higher returns available for olives used for small-scale production of premium olive oil began to affect industry statistics in 1999, when average prices of olives used for oil increased to $200 per ton. Average prices of olives used for oil increased further to $300 per ton in 2000 and 2001, before decreasing to $240 per ton in 2002. Average returns for olives used for oil continue to be significantly below those canned and the proportion of the crop used for oil has remained under six percent since 1985. Crop utilization for oil and the ratio of prices of olives used for oil to prices of olives canned can be expected to increase, however, as the premium-quality, premium-price olive oil market niche grows.

Figure 1. Average Proportion of California Olive Crop Utilized for Oil with Ratio of Prices for Olives Crushed to Prices for Olives Canned, 1920-2002



Economic Feasibility of Oil Production

U.S. consumption of all salad and cooking oils increased steadily from 15.4 pounds per capita in 1970 to 33.7 pounds per capita in 2000. Imports of olive oil, which account for over 99 percent of U.S. consumption, increased from 97 million pounds in 1985 to 449 million pounds in 2000. The increase was from 0.41 pounds per capita in 1985 to 1.59 pounds per capita in 2000. Despite the very large increase in consumption, olive oil still accounts for less than five percent of total U.S. salad and cooking oils consumption. While there is room for additional growth for olive oil, it faces competition from lower priced vegetable oils, including canola, corn and safflower. California olive oil will become slightly more competitive if the European Union reduces subsidies for olive oil production, which have recently been equivalent to about $0.70 per liter.

Input–output relationships for olive oil provide a measure of net prices required to provide returns equivalent to those available for canning olives. Important variables considered include oil content, processing costs, price for canning olives and average per acre yields. The oil content of olives varies by variety. Currently, the five most important California varieties, listed in descending order of crop size, are Manzanillo, Sevillano, Mission, Ascolano and Barouni. The Mission variety is best for oil extraction with oil content in the range of 20 to 24 percent. The

Manzanillo variety, with oil content in the 18 to 20 percent range, is best suited for canning but is also used for oil. The other major varieties are not well suited for oil production.

Approximately 4,000 acres of new olives have been planted specifically for oil production during the last six years. This includes 1,886 acres of the Spanish varieties, Arbequina and Arbosana, and 110 acres of the Greek variety, Koroneiki, that are suitable for super-high-density planting (650 to 900 trees per acre) and that can accommodate over-the-row mechanical harvesters. There are another 810 acres of high-density plantings (250 to 300 trees per acre) of Italian oil varieties (Frantoio, Leccino, Pendolino, Taggiasca and Coratina). The total acreage of olives grown for oil in 2004 was reported to be 6,168 acres with 66 percent classified as organically grown. These specialized plantings will increase the supply of olive oil and improve the economics of oil production as they reach bearing age and mature.

The method and scale of oil extraction is also an important cost consideration. Production stages include cleaning the olives, grinding into paste, mixing and heating the paste, separating the oil and water from the paste, and storage and bottling the olive oil. Technologies for grinding include stone olive mills, metal toothed grinders or hammer mills. The technologies available for separating the oil and water from the paste include lever or screw olive presses (the oldest technology), hydraulic olive press, centrifugal decanter, triple-phase centrifuge and the advanced dual-phase centrifuge (the most recent technology). A few of California's small-scale olive oil producers use stone mills and old-style presses and there are also producers that use hammer mills and dual-phase centrifuges. Note that the modern technology is more environmentally friendly with reduced water disposal.

Olive Oil Production Costs

Budget data, charges for custom operations and input/output relationships can be used to illustrate the impact of various cost components on total costs of olive oil production. Important variables include opportunity costs based on prices paid for olives used for canning, recovery and oil extraction rates, custom rates for processing, packaging costs and marketing costs.

Cost of Raw Olives: The net cost per liter of olive oil attributed to raw olives will vary with the price per ton for olives, the oil content of the olives and the proportion of oil recovered. Table 1 includes the effects of three alternative prices per ton for olives and three net extraction rates for oil. University of California budgets have used a recovery rate of 90 percent. This means that the oil content of olives before processing would be 16.67, 19.44 and 22.22 percent to yield net extraction rates of 15, 17.5 and 20 percent. Three levels of returns for canning olives, $500, $600 and $700 per ton, will be used to show the contribution of raw product to the cost of producing a liter of oil. The derivation of the figures in Table 1 can be illustrated for a cost of olives of $500 per ton and a 15 percent extraction rate. A ton of olives will yield 300 pounds of oil at a 15 percent extraction rate, which converts to 151.5 liters of oil at 1.98 pounds per liter. If olives cost $500 per ton, the raw product value of the oil will be $3.30 per liter.

Table 1. Cost of Olive Oil for Alternative Values of Olives and Net Oil Extraction Rates

Opportunity Cost of Olives, $ per Ton	Net Extraction and Recovery Rate		
	15%	17.5%	20%
	Raw Product Cost, $/Liter of Oil		
$500	$3.30	$2.83	$2.48
$600	$3.96	$3.39	$2.97
$700	$4.62	$3.96	$3.47

Custom Processing Charges: Firms offering public milling services charge from $275 to $400 per ton, with the charge varying by firm and the total amount of olives milled. Thus, the cost of processing on a per liter or per case of oil basis will also depend on the oil content of the olives and the extraction rate.

Budgeted Costs: The University of California budgeted costs for olive oil production include a charge of $29.07 per gallon ($7.68 per liter) to press, process, bottle, label and cork olive oil, and a marketing charge of $13.87 per gallon ($3.66 per liter), for a total cost of processing and marketing of $42.94 per gallon, or $11.34 per liter. Costs for the olives to produce the oil will be in addition to the processing and marketing charges. At $500 per ton (including harvesting costs), the cost of the olives will add another $2.83 per liter, for total costs of $14.17 per liter. With costs at this level, it is clear that a premium price is required for profitability. A number of factors could work to reduce the high costs of processing and marketing, including economies associated with increased processing volumes and improved plant utilization, economies associated with larger volume purchases of inputs, increased mechanization with larger scale operations and economies of scale in marketing operations.

Spanish Cost Structure

Spain, with a well-established and large-scale olive oil processing sector, enjoys a cost structure that is much lower than outlined for California. The Spanish processing sector already has high input volumes, high plant utilization and is mechanized. The majority of Spanish olive oil is processed by grower cooperatives. In 2001, Spanish growers' prices for olive oil ranged from $2,990.88 to $3,234.51 per ton of oil, depending on quality. With 1,010.10 liters of olive oil per ton, this converts to $2.96 to $3.20 per liter of oil. Subsidies from the European Union of approximately $0.70 per liter increased grower returns to a range of $3.66 to $3.90 per liter of olive oil. We can work back to obtain a price per ton for olives used for oil. Using an oil yield of 20 percent, a ton of oil would require five tons of olives. Thus, the price per ton for the olives would range from $598.18 to $646.90. If the oil yield was 15 percent, more olives would be required and the price per ton would be in the range of $448.63 to 485.18.

Costs of production for Spanish-grown olives vary significantly depending on the number of trees planted per hectare, yields per hectare and production system. Sample costs of production for Andalucia illustrate the range of total costs per hectare and per kilogram of olive oil. The traditional production system with low average yields has the lowest total costs per hectare (685.15 euros per hectare), but with low average yields, it also has the highest average costs at 2.85 euros per kilogram of oil production. The modern intensive production system, which includes more trees per hectare and irrigation, has the highest estimated total costs but with the highest average yields, the average costs of olive oil are reduced to 1.14 euros per kilogram of oil produced. Therefore, given recent exchange rates ($1.30 per euro), Andalucia's average costs of production range from $1.33 to $3.33 per liter of oil.

Detailed data for costs of processing, packaging and distribution of Spanish olive oil are not readily available. Given the scale of the Spanish industry, however, average costs are certain to be substantially less than costs of custom processing in California. Retail price data for extra virgin olive oil in the U.S., as reported by IRI, provide an indication of the cost advantage. The 2004 Chairman's Report for the North American Olive Oil Association shows average supermarket retail prices of $7.98 per liter (in 1 liter containers) and $5.16 per liter (in 3 liter containers) for the 52 weeks ending May 30, 2004. Most of the olive oil sold at retail in the U.S. is imported from Italy and Spain, so these prices are essentially for imported oil. The lack of grade standards for olive oil in the U.S. lead California producers to charge that much of the imported oil labeled as extra virgin is actually lower in quality than that sold as extra virgin olive oil in Europe. The California Olive Oil Council has petitioned the USDA to enforce International Olive Oil Council standards in the U.S. They believe that this will result in a much lower proportion of imported olive oil labeled as extra virgin and that a larger price premium for the higher quality product will make California extra virgin olive oil more competitive with imports.

Concluding Comments

U.S. per capita consumption and imports of olive oil have more than doubled over the last decade, with a portion of the increase attributed to consumers' diet and health concerns. A niche market has developed for California produced, handcrafted, boutique olive oil, but the volumes sold continue to be small, and imported olive oil continues to account for over 99 percent of U.S. consumption. Even with the overall growth in demand for olive oil and California's small market share, the high costs of small-scale processing and marketing will limit the amount of olive oil that can be profitably processed in California. If California's entire olive crop were crushed for oil, it would be able to substitute for less than 10 percent of recent imports. As in the past, increased demand for olive oil will be largely satisfied by imports from Italy and Spain, the largest traditional suppliers for the U.S. market.

For additional information, the authors suggest the following sources:

http://naooa.mytradeassociation.org/bm~doc/chairmans-report-for-2004.ppt.

The Olive Oil Source, http://www.oliveoilsource.com.

Vossen, P., K.Klonsky and R. DeMoura. *Sample Costs to Establish An Olive Orchard and Produce Olive Oil 2001,* University of California Cooperative Extension, http://coststudies.ucdavis.edu.

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