

Avocado Sample Establishment and Production Costs and Profitability Analysis for Ventura and Santa Barbara Counties

Based on 2001 Data Collected in Ventura and Santa Barbara Counties, California

By

Etaferahu Takele, Area Farm Advisor, Agricultural Economics/Farm Management,
UCCE Southern California

Ben Faber, Farm Advisor, Soils and Water, Avocados and Minor Subtropicals,
UCCE Santa Barbara & Ventura Counties

Silvana Chambers, Staff Research Associate, UCCE Southern California

The authors wish to express their appreciation to those cooperators who provided data and review in the development of this study.

To simplify information, trade names of some products have been used in this report. No endorsement of named products is intended, nor criticism implied of similar products that are not mentioned.

The avocado industry of California constituted about 58,600 acres in 2000 according to the California Avocado Commission (CAC). Acreage declined from over 70,000 at the beginning of the 1990s, however, the decline has slowed down in recent years. Ventura and Santa Barbara Counties are major avocado producers in California. Currently they constitute about 22,000 to 24,000 acres (depending on the source of estimates) which is about 38% to 41% of the avocado acreage in California.

Many of the orchards in Ventura and Santa Barbara Counties are old and several of them are being considered for replanting. Also new acreages are being considered as an alternative to Valencia oranges and lemons. We present this study to growers, prospective growers, agricultural lenders, and others concerned with the avocado industry to use as an information source for production practices and to estimate financial requirements of establishing and maintaining avocado groves.

The study is based on assumptions of avocado grove establishment and production practices that are considered typical in Ventura and Santa Barbara Counties. While the assumptions outlined in this study may not fit all conditions, they represent current trends of production and the methodology can be easily adapted to address individual situations and to analyze costs, profits, and investments not only in Ventura and Santa Barbara Counties but also in other production areas throughout California. When practices deviate from those given in this publication, growers can enter and substitute their own costs for comparison with ours in the "Your cost" column in tables 2 and 3. *Please note that because of rounding, the totals given in tables 1 through 7 may differ slightly from the sums of their constituent numbers.*

Following is a discussion of the assumptions and calculation methods we used in this study. Cultural practices and cost data are presented in detail in seven tables:

Table 1. Sample costs per acre to establish an avocado grove

Table 2. Costs per acre to produce avocados

Table 3.	Costs and returns per acre to produce avocados
Table 4.	Monthly cash costs per acre to produce avocados
Table 5.	Farm equipment and investment values and annual costs
Table 6.	Farm equipment actual hours of use and hourly costs
Table 7.	Range analyses of avocado production costs and returns
	Part A. Costs per acre and per pound at varying yields
	Part B. Returns per acre above operating costs
	Part C. Returns per acre above all cash costs (gross margin)
	Part D. Returns per acre above total costs (returns to management)

ASSUMPTIONS

1. ORCHARD SPECIFICATION

We based this study on a grove size of 11 acres located on moderately sloped land. Ten acres will be in the actual avocado production and one acre in roads and farmstead.

2. ESTABLISHMENT AND PRODUCTION PRACTICES

Land preparation for orchard establishment. In Ventura and Santa Barbara Counties new avocado orchards are commonly planted on previous avocado ground thus all the roads and drainage systems are in place except for a few repairs and maintenances that may be needed. However, we want this study to represent plantings on new/open land in which case all the land preparation costs are included.

Land preparation for new orchard layout includes the following. In hillside plantings, brush is first crushed into the slope by a crawler tractor to leave organic residue on the surface and to help with erosion control. Roads required for travel and harvest are constructed before planting. Tree orientation is usually designed to suit the irrigation and drainage system, slope and grading for erosion control. Erosion control methods include paving the roads, installing drainage systems and seeding the exposed areas of the slope.

Many of the land preparation operations are done under contract by orchard management services.

Planting. There are several types of planting spaces. In recent years there have been some high-density plantings which include spacings of 6' x 6', 8' x 8', 10' x 10' etc. However, this study is based on the most common planting space of about 20' x 20' with 109 trees per acre. Most plantings in Ventura and Santa Barbara Counties include the Hass variety. Trees are planted and wrapped. Then mulch is added around the base so that moisture loss is decreased and weeds are contained. The wrapping of trees and mulch application also helps erosion control. At planting a stake is placed beside each tree for support. During the second year, some replanting of trees will take place. In this study we assumed 5% or 5 trees per acre are being replaced during the second year.

Pruning. Pruning begins at around year 4 of establishment. Pruning consists of removing deadwood, and creation and maintenance of a desirable tree structure and size. This operation also creates access for easy harvest.

Irrigation. Water cost varies tremendously among growers depending on the source and method of acquisition. Most avocado growers in Ventura and Santa Barbara Counties use private or communal wells for irrigation. Farms with 20 or more acres may have private wells. Some growers use district wells. Also pumping capacity, pump size, elevation, distance from wells etc influence the cost of irrigation.

In this study we used a weighted average water price from information developed by farm advisors of the University of California Cooperative Extension for various districts in Ventura County in 1993 and the Ventura County Ground Water Management Agency. Then we added 2 percent inflation per year to reflect current purchasing price. We also assumed that the costs of water in Santa Barbara County will be about the same as Ventura County.

The irrigation system is installed before planting in year 1. During the first two years of establishment, the orchard is irrigated using drip emitters. In the first year one emitter is placed on the root ball. In the second year the emitter is moved from the root ball and placed on one side of the tree. Then a second emitter is added on the other side of the tree.

In the third year the drip emitters are replaced with micro sprinklers. One micro sprinkler, emitting 10 to 15 gallons per hour, is used per tree. Water is not allowed to wet the tree trunk.

The frequency and amount of irrigation depends on weather and rainfall. In some years irrigation is needed every month of the year, and in other years irrigation may not be required for more than four to five months. In this study we assumed irrigation taking place four times a month from April through October in the first year and three times a month during the same months from year 2 on.

Irrigation cost also includes labor to inspect the system for water flows and to fix any problems such as leaks or emitter clogging caused by squirrels, insects, chemical precipitation etc.

Water requirement estimates at various ages of trees is provided in table A.

Table A. Irrigation water application in Ventura and Santa Barbara Counties avocado production

Year	Acre-inches per acre per year	Gallons per tree per year
1	6	1,495
2	10	2,492
3	14	3,488
4	18	4,485
5	22	5,481
6	26	6,478
7 +	30	7,475

Pest Management. Beneficial insects are used to control omnivorous looper and amorbia moth. A pest control advisor monitors pest population levels in the orchard and releases beneficial insects as needed. Also avocado thrips controls are applied every year beginning in the third year.

Gopher and squirrel controls are needed during the first three or four years of trees establishment. Gophers can cause serious damage to young trees and ground squirrels can cause erosion problems by tunneling through the soil. Baits are used to control squirrels and traps are used for gophers. Gopher and squirrel control need to begin at planting and continue as long as these rodents can be found.

Other pests may be present in the orchard. Growers can adjust their costs of pest management as applicable. For information and pesticide use permits, contact your county Agricultural Commissioner's office. You can also find pest management information from the University of California on the UC Statewide Integrated Pest Management Project website, <http://www.ipm.ucdavis.edu/PMG/selectnewpest.avocado.html>.

Weed Management. Controlling weeds includes spraying several times (three times in this study) a year and cutting weeds using a weed whip once a year sometime during spring. As trees grow larger, the shade will reduce weed growth.

Fertilization. The amount of fertilizer applied increases with age of trees. Table B provides the typical amounts of nitrogen (N) applied by growers. Nitrogen is injected through the irrigation line during the course of the year. Additionally, zinc sulfate is applied beginning year 3.

Table B. Pounds of nitrogen fertilizer applied in Ventura and Santa Barbara Counties avocado production

Year	Pounds of N per acre	Pounds of N per tree
1	6	0.06
2	13	0.12
3	22	0.20
4	33	0.31
5	66	0.61
6	100	0.92
7+	100	0.92

Pollination. Beehives for pollination are put in the orchard beginning in the third year of establishment.

3. HARVESTING, MARKETING, AND INSPECTION

Harvesting begins at the end of the third year of establishment. Weather and market conditions dictate the period of harvest. In this study we assumed that harvesting takes place in the months of March, September, and October. These months are the most common periods of harvesting in the counties.

Harvesting costs include picking and hauling to a nearby packinghouse. There are also marketing order fee by the California Avocado Commission (CAC) and inspection fee by the California Department of Food and Agriculture (CDFA). Picking and hauling costs are based on pounds of production. CAC marketing order fee is based on pounds of avocados sold. CDFA inspection fee is for maturity and quality standards. Picking and hauling costs for this study were provided by the UCCE Ventura County farm advisor. The CAC marketing order fee was obtained from the CAC. The inspection fee was provided by the CDFA.

Risk. There are several risks associated with producing and marketing avocados. Production risk can be caused by various sources of uncertainty including insect damage, diseases, and severe frost that affect production. Frost is the main production risk in Ventura and Santa Barbara Counties. The market and prices of avocados are also very volatile. They are caused by factors such as a decrease in the demand for avocados, and or an oversupply in the national and international production.

While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic, and market risks which affect the profitability and economic viability of all producers. Access to information on production practices, prices, and markets are crucial for those involved in avocado production and marketing.

4. YIELD AND PRICES

Yield. Fruit bearing begins in the third year of establishment of the avocado trees. We used the yield assumptions provided in table C to estimate income during the establishment and production years. In production years we analyzed the effects of a range of yield on returns and profitability (table 7).

Table C. Typical yield assumptions of avocados in Ventura and Santa Barbara Counties

Year	Yield (lbs/acre)
3	500
4	2,000
5	4,000
6	6,000
7+ (Maturity)	7,500 average

Prices. We used a five year weighted average price (Agricultural Crop Reports for the 1996 to 2000 period) for Ventura and Santa Barbara Counties (appendix table) to estimate gross returns. However, we included a range of prices to analyze returns and profitability in the production years (table 7).

5. INTEREST ON OPERATING CAPITAL

We calculated interest on operating capital using a nominal rate of a three year average (1999 to 2001) of 8.5 percent per year. Interest on operating capital reflects the costs of borrowing money or an opportunity cost for using in-house funds. Interest on operating capital is charged until income is received from the crop at harvest.

6. LABOR

Labor cost includes both owner and hired services at the same wage rate. Labor wages vary by operation, location and type of benefits included. We used \$12 per hour wage rate including benefits based on information we obtained from some growers in Ventura and Santa Barbara Counties.

7. EQUIPMENT OPERATING CASH COSTS

Equipment operating cash costs for fuel, lubrication, and repairs are calculated using formulas and coefficients developed by the American Society of Agricultural Engineers (ASAE). Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on machinery horsepower (maximum PTO hp) and type of fuel used.

Gasoline price used in this study is an average provided by the United States Department of Agriculture Statistics for the Pacific region. Fuel prices have been high in the past two years. To account for this increase and the possible downward adjustment in the future, we used a five-year average price for the 1996 to 2000 period.

8. CASH OVERHEAD

Office expenses. Expenses in this category cover office supplies, telephone services, operating costs for a fax machine, photo copier, and computer, bookkeeping, accounting, legal fees, and so on.

Property taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property, including land, equipment, buildings, and improvements. Special assessment districts in some counties charge additional taxes on property. For our study we calculated county taxes at 1 percent of the value of the property.

Property insurance. Growers also carry insurance for property protection, which is typically calculated at 0.713 percent of the average value of assets. In addition, a farm of the size specified in this report would carry liability insurance of \$367 per year to cover accidents on the entire farm.

Investment repairs. Investment repairs and maintenances are calculated at 1 to 3.5 percent of the investment values as suggested in some farm management books. The repair rates for the irrigation system, however, are calculated at 10% for sprinkler and dripper emitters and 5% for the main system based on local information.

Interest on establishment. Interest on establishment is calculated to reflect the accruing of charges on loans or returns forgone during the establishment years.

Other expenses. These expenses include liability insurance, root rot analysis, leaf analysis, soil/water analysis conducted each year, sanitation fee, and interest on operating capital (cash overhead). Sanitation fee includes rent for portable field toilets during harvest time.

9. NON-CASH OVERHEAD COSTS

The non-cash overhead costs of assets include land rent, ownership costs of farm equipment and other investments like building, tools, irrigation system, and amortized establishment costs.

Land rent. In most cases, in Ventura and Santa Barbara Counties, groves are being re-planted on previous avocado land, therefore most growers may not be incurring land mortgage. However, we place an opportunity cost for the use of land in avocado production. That is to show that the land could have been used in other return (interest) yielding alternatives. The land rent is to reflect the return foregone from those alternatives.

Land rent is calculated at an opportunity cost rate of 6.5% of the value of land. This rate is the ten year average of rates of return to production assets from current income of the California's agricultural sector. The idea is that the use of the land should at least earn this rate.

The value of land is calculated from orchard values published in the California Chapter of the American Society of Farm Managers and Rural Appraisers for year 2000. We were told by local appraisers that the value of

land will constitute about 60% to 75% of the orchards value. For this study, we calculated the land value to account for 70% of the weighted average value of orchards for Ventura and Santa Barbara counties. This value equals \$14,800 per acre. Since there are 10 acres in the actual avocado orchard with another 1 acre of roads and farmstead on which avocados are grown, this increases the cost of land to \$16,200 per producing acre.

Ownership costs of farm equipment and investments. These costs are calculated using the capital recovery method. This method allows growers to calculate an annual amount of money to charge the enterprise so that the value of assets will be recovered within a specified period of time at a designated rate of interest. The rate of interest used to calculate ownership cost is 6.5 percent -- California's long-term rate of return on agricultural production assets from current income. Because farms use a mix of old and new equipment, we evaluated the value of the equipment complement at 60 percent of new prices.

Amortized establishment cost. We used the first six years as periods of establishment. We made the assumption that after year six the orchard is considered mature.

Our estimate of the total six-year tree establishment costs is \$14,751 per acre. This amount is the accumulated cost of establishment less the gross income over the six-year period.

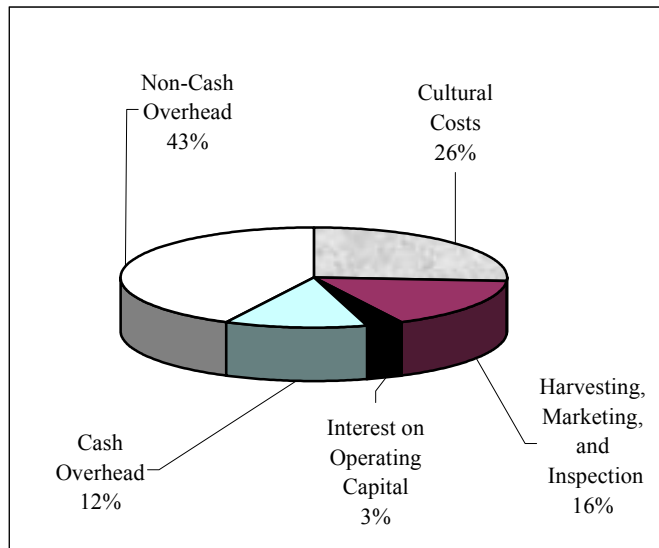
The value of trees is amortized at the long-term average rate of return on agricultural production assets from current income over a 30 year productive life to determine the annual amount that must be recovered from the investment.

10. SUMMARY OF PRODUCTION COSTS

Our estimate of total annual production cost for avocados in Ventura and Santa Barbara Counties is \$5,540 per acre (tables 2 and 3). Table 2 presents costs by type of activity and table 3 present costs by type of input.

The pie graph that follows shows the proportion of costs by category. It consists of about 26% for cultural costs such as pruning, weed control, pollination, erosion control, pest control, fertilization, irrigation, and rodent control. Harvesting costs of picking, hauling, and marketing and inspection account for 16%. Interest on operating capita is about 3%. Cash overhead such as liability insurance, root rot analysis, leaf analysis, soil analysis, sanitation fee, office expenses, property taxes, property insurance, and investment repair is 12%. Non-cash overhead or annual ownership costs of land rent, equipment, buildings, tools, irrigation system, and amortization of the accumulated tree establishment is about 43%.

Figure 1. Proportion of production costs for avocados, in Ventura and Santa Barbara Counties, 2001



11. PROFITABILITY ANALYSIS

We analyzed profitability using break-even costs per pound for various yield levels as well as using gross and economic margins at various combinations of yield and prices.

Break-even costs allow growers to compare expected market prices with the unit cost of production. Break-even cost is calculated as the cost of production per acre divided by yield per acre. Gross margin (or returns above cash costs) is what growers often refer to as *profit* if there is no debt on the farming operation. It approximates the return to management and investment. If you deduct depreciation, it also approximates taxable income. Gross margin is calculated as gross returns (price times yield) minus cash costs of production.

Economic profit (or returns above total cost including management) is a very useful measure of how attractive the enterprise is for potential investors and entrants into the business. Economic profit can be positive or zero. A zero economic profit should not be alarming if all costs, including the owners' labor and management fees, are included in the production cost. In this study we do not include management charges, so the return after all costs are deducted reflects return to management. Returns to management is calculated as gross returns minus cash and non-cash costs of production. Crop yield and prices received by growers vary from individual to individual. We have provided a range analyses of price and yield variations on profitability so that each grower can find figures that best match his or her specific situation. The range analyses include break-even costs at various yields as well as gross margins and returns to management at various yields and price combinations (table 7).

REFERENCES

Agricultural Prices. 2000. United States Department of Agriculture, National Agricultural Statistics Service. <http://usda.mannlib.cornell.edu/>

American Society of Agricultural Engineers. 1992. American Society of Agricultural Engineers Standards Yearbook. St. Joseph, MI.: ASAE.

Boehlje, M. D. and V. R. Eidman. 1984. Farm Management. John Wiley and Sons. New York, NY.

California Avocado Crop Statistics. 2000. California Avocado Commission. Santa Ana, CA.

Integrated Pest Management Education and Publications. 2001. UC IPM Pest Management Guidelines, Avocado. In Faber, B. A., P.A. Phillips, L. J. Marais, B. B. Westerdahl, and U.C. Kodira (ed.). University of California. Division of Agriculture and Natural Resources. Oakland, CA. Publication 3339.
<http://www.ipm.ucdavis.edu/PMG/selectnewpest.avocado.html>

Santa Barbara County Agricultural Commissioner. 1996 to 2000. Santa Barbara County Agricultural Production Report. Santa Barbara, CA.

Schwankel, L., T. Prichard, B. Hanson, and I. Wellman. 2000. Costs of Pressurized Irrigation Systems for Tree Crops. University of California Agriculture and Natural Resources. Oakland, CA.

United States Department of Agriculture-Economic Reporting Service. 2001. Farm Financial Ratios Indicating Solvency and Profitability 1960 to 2000, California. www.ers.usda.gov/data/farbalancesheet/fbsdmu.htm

Ventura County Agricultural Commissioner. 1996 to 2000. Ventura County Annual Crop Report. Santa Paula, CA.

Trends in Agricultural Land and Lease Values. 2001. Californian Chapter of the American Society of Farm Managers and Rural Appraisers. Sacramento, CA.
<http://www.calasfmra.com/landvalues/index.htm>

Table 1. Sample costs per acre to establish an avocado grove in Ventura and Santa Barbara Counties, based on 2001 data

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
OPERATING COSTS:						
Pre-Planting Costs:						
Clear land & road building	1,155					
Orchard layout	96					
TOTAL PRE-PLANTING COSTS	1,251					
Planting Costs:						
Avocado tree	2,289					
Digging, planting, wrapping, mulching, & staking trees	545					
TOTAL PLANTING COSTS	2,834					
Replanting Costs:						
Replaced trees - 5%		105				
Digging, planting, wrapping, mulching, & staking replaced trees - 5%		25				
TOTAL REPLANTING COSTS		130				
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)						
Orchard pruning				48	96	192
Weed control - Roundup (3x)	79	79	79	79	79	79
Pollination			70	70	70	70
Erosion control	68	17	17	17	17	17
Weed control - weed whip (1x)	24	24	24	24	24	6
Rodent control - gopher traps (2x)	5	5	5			
Pest control - VeratranD Air Spray (3x)			225	225	225	225
Fertilize - Zinc Sulfate 12% (1x)			2	3	5	6
Pest control - Oil Air Spray (1x)			65	65	65	65
Fertilize UN32 (7x)	3	5	9	13	27	40
Irrigate & walk lines	130	191	259	330	395	462
Pest control advisor			60	60	60	60
Rodent control (squirrels)	23	23	23	23	23	23
TOTAL CULTURAL COSTS	332	345	838	958	1,085	1,246
Harvesting, Marketing, and Inspection Costs:						
Picking - \$0.08 per pound			40	160	320	480
Hauling - \$0.004 per pound			2	8	16	24
CAC assessment fee - \$0.035 per pound			18	70	140	210
CDFA inspection fee - \$0.001 per pound			1	2	4	6
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS			60	240	480	720
Interest on Operating Capital @ 8.50%:	367	30	53	71	92	116
TOTAL OPERATING COSTS	4,784	505	951	1,269	1,657	2,082

Table 1. Sample costs per acre to establish an avocado grove in Ventura and Santa Barbara Counties, based on 2001 data (cont.)

	1st	2nd	3rd	4th	5th	6th
Cash Overhead Costs:						
Liability insurance	37	37	37	37	37	37
Root rot analysis	3	3	3	3	3	3
Leaf analysis	5	5	5	5	5	5
Soil analysis	5	5	5	5	5	5
Sanitation fee			44	44	44	44
Office expenses	180	180	180	180	180	180
Property taxes	173	200	208	217	222	220
Property insurance	8	27	33	39	43	41
Investment repairs	75	78	84	84	84	84
Interest on operating capital (cash overhead)	20	22	29	29	29	29
Interest on establishment		554	798	1,062	1,249	1,316
TOTAL CASH OVERHEAD COSTS	506	1,110	1,425	1,706	1,901	1,964
TOTAL CASH COSTS	5,290	1,615	2,376	2,974	3,558	4,046
INCOME FROM PRODUCTION	0	0	500	2,000	4,000	6,000
NET CASH COSTS FOR THE YEAR	5,290	1,615	1,876	974	-442	-1,954
ACCUMULATED NET CASH COSTS	5,290	6,905	8,781	9,755	9,314	7,360
Non-cash Overhead:						
Land rent	1,053	1,053	1,053	1,053	1,053	1,053
Equipment	5	5	5	5	5	5
Building	73	73	73	73	73	73
Tools (shovels, picking bags, saws, etc.)	20	20	20	20	20	20
Irrigation system	67	67	67	67	67	67
Drippers	13	39				
Sprinklers			8	8	8	8
TOTAL NON-CASH OVERHEAD COSTS	1,231	1,257	1,225	1,225	1,225	1,226
TOTAL NET COST FOR THE YEAR	6,521	2,871	3,101	2,200	784	-727
TOTAL ACCUMULATED NET COST	6,521	9,393	12,494	14,693	15,477	14,751

Table 2. Costs per acre to produce avocados, Ventura and Santa Barbara Counties, 2001

Operation	Operation time (hrs/ac)	Costs per acre (\$)				Total cost	Your cost (\$)
		Labor cost	Fuel, lube, & repairs	Material cost	Custom/rent		
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)							
Orchard pruning	27.00	324	0	0	0	324	
Weed control - Roundup (3x)	4.00	58	15	7	0	79	
Pollination	0	0	0	0	70	70	
Erosion control	1.00	12	0	5	0	17	
Weed control - weed whip (1x)	0.50	6	0	0	0	6	
Pest control - VeratranD Air Spray (3x)	0	0	0	0	225	225	
Fertilize - Zinc Sulfate 12% (1x)	0	0	0	8	0	8	
Pest control - Oil Air Spray (1x)	0	0	0	0	65	65	
Fertilize UN32 (7x)	0	0	0	40	0	40	
Irrigate & walk lines	1.75	21	0	511	0	532	
Pest control advisor	0	0	0	0	60	60	
Rodent control (squirrels)	1.20	14	0	8	0	23	
TOTAL CULTURAL COSTS	35.45	435	15	578	420	1,449	
Harvesting, Marketing, and Inspection Costs:							
Picking - \$0.08 per pound	0	0	0	0	600	600	
Hauling - \$0.004 per pound	0	0	0	0	30	30	
CAC assessment fee - \$0.035 per pound	0	0	0	0	263	263	
CDEFA inspection fee - \$0.001 per pound	0	0	0	0	8	8	
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS	0	0	0	0	900	900	
Interest on operating capital @ 8.50%						141	
TOTAL OPERATION COSTS/ACRE		435	15	578	1,320	2,489	
Cash Overhead Costs:							
Liability insurance						37	
Root rot analysis						3	
Leaf analysis						5	
Soil analysis						5	
Sanitation fee						44	
Office expenses						180	
Property taxes						247	
Property insurance						61	
Investment repairs						84	
TOTAL CASH OVERHEAD COSTS						666	
Interest on operating capital (cash overhead) @ 8.50%						31	
TOTAL CASH COSTS/ACRE						3,186	

Table 2. Costs per acre to produce avocados, Ventura and Santa Barbara Counties, 2001 (cont.)

	Cost per producing acre	Annual cost: capital recovery	Total cost	Your cost (\$)
Non-cash Overhead:				
Land rent	16,200	1,053	1,053	
Equipment	35	5	5	
Building	1,000	73	73	
Tools (shovels, picking bags, saws, etc.)	200	20	20	
Irrigation system	920	67	67	
Sprinklers	109	8	8	
Amortized establishment cost	14,751	1,130	1,130	
TOTAL NON-CASH OVERHEAD COSTS	33,215	2,355	2,355	
TOTAL COST/ACRE			5,540	

Table 3. Costs and returns per acre to produce avocados, Ventura and Santa Barbara Counties, 2001

	Quantity per acre	Unit	Price or cost per unit (\$)	Value or cost per acre (\$)	Your cost (\$)
Gross Returns	7,500.00	pound	1.00	7,500	
TOTAL GROSS RETURNS FOR AVOCADOS					
Operating Costs:					
Herbicide:					
Roundup (3x)	1.00	pint	6.50	7	
Rent:					
Bee hives	2.00	hive	35.00	70	
Miscellaneous:					
Erosion control	1.00	acre	5.00	5	
Harvest, Market, and Inspection:					
Pick (3x)	7,500.00	pound	0.080	600	
Haul (3x)	7,500.00	pound	0.004	30	
CAC assessment (3x)	7,500.00	pound	0.035	263	
CDFA inspection (3x)	7,500.00	pound	0.001	8	
Pest Management:					
VeratranD Air Spray (3x)	1.00	acre	225.00	225	
Oil Air Spray (1x)	1.00	acre	65.00	65	
Pest control advisor	1.00	acre	60.00	60	
Fertilize:					
Zinc sulfate 12% (1x)	5.00	gallon	1.51	8	
UN32 (7x)	26.46	gallon	1.52	40	
Water:					
Water	30.00	acre-inch	17	511	
Rodenticide:					
Squirrel bait (12x)	2.64	pound	2.32	6	
Bait station	1.00	acre	2.30	2	
Labor (machine):	4.80	hours	12.00	58	
Labor (non-machine):	31.45	hours	12.00	377	
Fuel (gasoline):	5.76	gallon	1.45	8	
Lube:				1	
Machinery repair:				6	
Interest on operating capital @ 8.50%:				141	
TOTAL OPERATING COSTS/ACRE				2,489	
NET RETURNS ABOVE OPERATING COSTS				5,011	

Table 3. Costs and returns per acre to produce avocados, Ventura and Santa Barbara Counties, 2001 (cont.)

	Quantity per acre	Unit	Price or cost per unit (\$)	Value or cost per acre (\$)	Your cost (\$)
Cash Overhead Costs:					
Liability insurance				37	
Root rot analysis				3	
Leaf analysis				5	
Soil analysis				5	
Sanitation fee				44	
Office expenses				180	
Property taxes				246	
Property insurance				60	
Investment repairs				84	
Interest on operating capital (cash overhead) @ 8.50%				31	
TOTAL CASH OVERHEAD COSTS				696	
TOTAL CASH COSTS/ACRE				3,186	
Non-cash Overhead:					
Land rent				1,053	
Equipment				5	
Building				73	
Tools (shovels, picking bags, saws, etc.)				20	
Irrigation system				67	
Sprinklers				8	
Amortized establishment cost				1,130	
TOTAL NON-CASH OVERHEAD COSTS				2,355	
TOTAL COST/ACRE				5,540	
NET RETURNS ABOVE TOTAL COSTS				1,960	

Table 4. Monthly cash costs per acre to produce avocados, Ventura County and Santa Barbara Counties, 2001

Beginning Feb 2001 Ending Jan 2002	Costs per acre (\$)												TOTAL	
	Feb 2001	Mar 2001	Apr 2001	May 2001	Jun 2001	Jul 2001	Aug 2001	Sep 2001	Oct 2001	Nov 2001	Dec 2001	Jan 2002		
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)														
Orchard pruning	324													324
Weed control - Roundup (3x)	27			27			27							79
Pollination		70												70
Erosion control		17												17
Weed control - weed whip (1x)		6												6
Pest control - VeratranD Air Spray (3x)		75	75	75										225
Fertilize - Zinc Sulfate 12% (1x)				8										8
Pest control - Oil Air Spray (1x)							65							65
Fertilize UN32 (7x)			6	6	6	6	6	6	6	6				40
Irrigate & walk lines			76	76	76	76	76	76	76	76				532
Pest control advisor	5	5	5	5	5	5	5	5	5	5	5	5	5	60
Rodent control (squirrels)	2	2	2	2	2	2	2	2	2	2	2	2	2	23
TOTAL CULTURAL COSTS	357	175	164	198	89	89	180	89	89	89	7	7	7	1,449
Harvesting, Marketing, and Inspection Costs:														
Picking - \$0.08 per pound		300							150	150				600
Hauling - \$0.004 per pound		15							8	8				30
CAC assessment fee - \$0.035 per pound		131							66	66				263
CDFA inspection fee - \$0.001 per pound		4							2	2				8
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS		450							225	225				900
Interest on operating capital @ 8.50%:	3	7	8	10	10	11	12	14	16	17	17	17	17	141
TOTAL OPERATING COSTS/ACRE	360	632	172	207	99	99	192	328	330	23	23	24	24	2,489
Cash Overhead Costs:														
Liability insurance					37									37
Root rot analysis						3								3
Leaf analysis								5						5
Soil analysis								5						5
Sanitation fee		15						15	15					44
Office expenses	15	15	15	15	15	15	15	15	15	15	15	15	15	180
Property taxes					124								124	247
Property insurance					30								30	61
Investment repairs	7	7	7	7	7	7	7	7	7	7	7	7	7	84
TOTAL CASH OVERHEAD COSTS	22	37	22	22	213	25	22	47	37	22	22	176	176	666
Interest on operating capital (cash overhead) @ 8.50%:	0.16	0.62	0.78	0.93	2.44	2.62	2.77	3.31	3.78	3.94	4.09	5.34	5.34	31
TOTAL CASH COSTS/ACRE	382	669	194	230	314	127	217	378	371	49	50	205	205	3,186

Table 5. Farm equipment and investment values and annual costs based on 10 annual farmed acres, Ventura and Santa Barbara Counties, 2001

Description	2001 Price (\$)	Life (yrs)	Salvage value (\$)	Capital recovery (\$)	Annual cash overhead (\$)		Total (\$)
					Insurance	Taxes	
Equipment:							
ATV 2WD & Sprayer	4,350	10	435	573	17	24	614
TOTAL EQUIPMENT	4,350		435	573	17	24	614
60% OF NEW COST *	2,610		261	344	10	14	368

Description	2001 Price (\$)	Life (yrs)	Salvage value (\$)	Capital recovery (\$)	Insurance	Taxes	Repairs	Total
Investment:								
Land rent	162,000	36	162,000	10,530	0	1,620	0	12,150
Building	10,000	36		725	36	50	225	1,036
Tools (shovels, picking bags, saws, etc.)	2,000	15	200	204	8	11	45	268
Irrigation system	9,200	36		667	33	46	460	1,206
Sprinklers	1,090	34		80	4	5	109	199
Amortized establishment cost	147,510	30		11,296	526	738	0	12,559
TOTAL INVESTMENT	331,800		162,200	23,503	606	2,470	839	27,418

Description	Enterprise/ farm size	Unit	Price per unit (\$)	Total cost (\$)
Business Overhead:				
Liability insurance	10	acre	36.7	367
Root rot analysis	10	acre	3	30
Leaf analysis	10	acre	5	50
Soil analysis	10	acre	5	50
Sanitation fee	10	acre	44	440
Office expenses	10	acre	180	1,800

*Used to reflect a mix of new and used equipment.

Table 6. Farm equipment actual hours of use and hourly costs based on 10 annual farmed acres, Ventura and Santa Barbara Counties, 2001

Description	Actual hours of use	Costs per hour (\$)					Total operating	Total costs per hour
		Capital recovery	Cash Insurance	Overhead Taxes	Repairs	Operating Fuel & lube		
ATV 2WD & Sprayer	300	1.15	0.03	0.05	1.32	2.18	3.50	4.73

Table 7. Range analyses of avocado production costs and returns, Ventura and Santa Barbara Counties, 2001

	Yield in pounds/acre								
	3,000	4,000	5,000	6,000	7,000	7,500	8,000	9,000	10,000
	-----\$/acre-----								
Part A. Costs per acre and per pound at varying yields									
Operating costs/acre:									
Cultural Costs	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
Harvesting Costs	360	480	600	720	840	900	960	1,080	1,200
Interest on operating capital	111	118	124	131	137	141	144	150	157
TOTAL OPERATING COSTS/ACRE	1,920	2,047	2,173	2,299	2,426	2,489	2,552	2,679	2,806
TOTAL OPERATING COSTS/POUND	0.64	0.51	0.43	0.38	0.35	0.33	0.32	0.30	0.28
CASH OVERHEAD COSTS/ACRE	696	696	696	696	696	696	696	696	696
TOTAL CASH COSTS/ACRE	2,616	2,743	2,869	2,996	3,122	3,186	3,249	3,375	3,502
TOTAL CASH COSTS/POUND	0.87	0.69	0.57	0.50	0.45	0.42	0.41	0.38	0.35
NON-CASH OVERHEAD COSTS/ACRE	2,355	2,355	2,355	2,355	2,355	2,355	2,355	2,355	2,355
TOTAL COSTS/ACRE	4,971	5,098	5,224	5,351	5,477	5,540	5,604	5,730	5,857
TOTAL COSTS/POUND	1.66	1.27	1.04	0.89	0.78	0.74	0.70	0.64	0.59
Part B. Returns per acre above operating costs									
Price (\$/pound):									
0.70	180	753	1,327	1,901	2,474	2,761	3,048	3,621	4,194
0.80	480	1,153	1,827	2,501	3,174	3,511	3,848	4,521	5,194
0.90	780	1,553	2,327	3,101	3,874	4,261	4,648	5,421	6,194
1.00	1,080	1,953	2,827	3,701	4,574	5,011	5,448	6,321	7,194
1.10	1,380	2,353	3,327	4,301	5,274	5,761	6,248	7,221	8,194
1.20	1,680	2,753	3,827	4,901	5,974	6,511	7,048	8,121	9,194
1.30	1,980	3,153	4,327	5,501	6,674	7,261	7,848	9,021	10,194
Part C. Returns per acre above all cash costs (gross margin)									
Price (\$/pound):									
0.70	-516	57	631	1,204	1,778	2,064	2,351	2,925	3,498
0.80	-216	457	1,131	1,804	2,478	2,814	3,151	3,825	4,498
0.90	84	857	1,631	2,404	3,178	3,564	3,951	4,725	5,498
1.00	384	1,257	2,131	3,004	3,878	4,314	4,751	5,625	6,498
1.10	684	1,657	2,631	3,604	4,578	5,064	5,551	6,525	7,498
1.20	984	2,057	3,131	4,204	5,278	5,814	6,351	7,425	8,498
1.30	1,284	2,457	3,631	4,804	5,978	6,564	7,151	8,325	9,498

Table 7. Range analyses of avocado production costs and returns, Ventura and Santa Barbara Counties, 2001 (cont.)

	Yield in pounds/acre								
	3,000	4,000	5,000	6,000	7,000	7,500	8,000	9,000	10,000
	-----\$/acre-----								
Part D. Returns per acre above total costs (returns to management)									
Price (\$/pound):									
0.70	-2,871	-2,298	-1,724	-1,151	-577	-290	-4	570	1,143
0.80	-2,571	-1,898	-1,224	-551	123	460	796	1,470	2,143
0.90	-2,271	-1,498	-724	49	823	1,210	1,596	2,370	3,143
1.00	-1,971	-1,098	-224	649	1,523	1,960	2,396	3,270	4,143
1.10	-1,671	-698	276	1,249	2,223	2,710	3,196	4,170	5,143
1.20	-1,371	-298	776	1,849	2,923	3,460	3,996	5,070	6,143
1.30	-1,071	102	1,276	2,449	3,623	4,210	4,796	5,970	7,143

Appendix

Harvested acreage, average yield, average prices, and average values per acre for avocados, Ventura County, 1996-2000

Year	Harvested acreage	Total pounds per acre	Price per pound	Value per acre
1996	12,998	5,820	0.79	4,598
1997	15,402	4,760	0.84	3,998
1998	16,647	3,800	0.93	3,534
1999	15,394	3,240	1.27	4,115
2000	15,760	4,120	1.13	4,656
Average	15,240	4,348	0.99	4,180

Harvested acreage, average yield, average prices, and average values per acre for avocados, Santa Barbara County, 1996-2000

Year	Harvested acreage	Total pounds per acre	Price per pound	Value per acre
1996	8,748	4,520	0.83	3,752
1997	8,381	3,580	1.11	3,974
1998	8,316	3,340	1.01	3,373
1999	8,290	4,040	1.28	5,171
2000	8,116	2,340	1.15	2,691
Average	8,370	3,564	1.07	3,792

Etaferahu Takele
Area Farm Advisor, Agricultural Economics
UCCE - Southern Region
21150 Box Springs Road
Moreno Valley, CA 92557-8718
Phone: (909) 683-6491 x 243
Fax: (909) 788-2615
E-mail: takele@ucra1.ucr.edu

Ben Faber
Farm Advisor, Soils and Water, Avocados and Minor Subtropicals
UCCE – Santa Barbara & Ventura Counties
669 County Square Drive, #100
Ventura, CA 93003-5401
Phone: (805) 645-1462
Fax: (805) 645-1474
E-mail: bafaber@ucdavis.edu

The University of California prohibits discrimination against or harassment of any person employed by or seeking employment with the University on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran, or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized). University Policy is intended to be consistent with the provisions of applicable State and Federal laws. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 1111 Franklin Street, 6th Floor, Oakland, CA 94607-5200, (510) 987-0096.

University of California Cooperative Extension and United States Department of Agriculture
cooperating.

Published January 2002.