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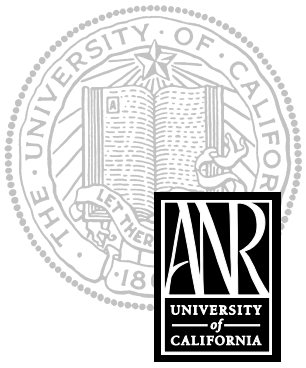

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Broccoli Production: Sample Costs and Profitability Analysis

Based on 1999 Data Collected in Ventura County, California

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This study presents sample costs of production for broccoli developed in Ventura County, California, in 1999, but the methodology we used to analyze costs, profits, and investments can easily be modified to address individual situations in production areas throughout California. Tables 1 and 2 include a "Your cost" column where growers can enter their own costs for comparison with ours. Also note that because of rounding, the totals given in tables 1 through 6 may differ slightly from the sums of their constituent numbers.

We based our study on certain assumptions that we developed from information on production practices and costs gathered from growers and agricultural institutions in the area. This is one of a series of six reports on vegetable crop production that are based on Ventura County data.

As a grower or other agriculture professional, you can benefit from this report in many ways. It can help you make production decisions, determine potential returns, prepare budgets, evaluate production loans, and analyze policies.

A discussion of the assumptions and calculation methods used in this study is provided in the text. Cultural practice and cost data are presented in detail in six tables:

UC PEER REVIEWED

Broccoli is grown for both the fresh and processed markets. Market price sometimes determines how broccoli is harvested. This study assumes that the costs of production are the same for fresh market and processed crops except for harvesting (picking and packing) and selling costs, crop prices, and yield.

STUDY ASSUMPTIONS

This report is based on a 1,300-acre vegetable farm, the average size of farm for the growers we interviewed. Most land used for vegetable crops in Ventura County produces two or more crops a year. Each crop is planted and harvested multiple times a year. Planting, harvesting, and selling of vegetable crops are year-round activities for growers, farm workers, and sellers.

We calculated our costs assuming that at least two crops are produced on each acre, resulting in a total of 2,600 farmed acres per year. For our study, the crops grown on the farm include broccoli, bell pepper, celery, spinach, loose-leaf lettuce, and cilantro (we have issued a report similar to this one for each of these crops). This crop mix is not present, of course, on every farm in Ventura County, but several farms in our interview pool did produce all six crops.

The growing period for each crop varies depending on time of planting. Consequently, production costs—particularly for irrigation, disease and pest management, and overhead—would be expected to vary. We based our study on an average growth period of minimum and maximum days. Prices used for materials, equipment, contract services, and labor wages (unless otherwise specified) are for the year 1999.

CULTURAL PRACTICES AND PRODUCTION INPUTS

Land preparation. Different types of fields and management preferences require different types of land preparation. Most growers in our interview pool performed several operations including multiple discing, ripping the soil to break up any underlying compacted soil, plowing, leveling using a triplane, chiseling, furrowing, listing, and shaping beds. Preplant fertilizer was applied together with the listing before the ground was shaped and rolled into beds.

Stand establishment. Broccoli is grown primarily in the Southern Desert Valley, the South Coast, the Central Coast, and the Central Valley areas of California. The primary varieties produced in Ventura County are Emperor, Greenbelt, and Marathon. All require similar cultural, harvesting, and marketing requirements.

Seeding rates vary depending on spacing. For this study, a rate of approximately 64,000 seeds per acre is used. A planted bed consists of two rows to a bed with bed centers 40 inches apart and seeds 5 inches apart within the row.

Weed management. Many growers in Ventura County use herbicides to control a wide range of grass and broadleaf weeds such as burning nettle *(Urtica urens),* sowthistle *(Sonchus oleraceus),* and prickly lettuce *(Lactuca serriola)*. Growers indicated that the application of an herbicide within 3 to 6 weeks of planting virtually eliminates any need for hoeing.

Fertilization. Preplant fertilizer of nitrogen (N) and phosphorous (P) is in most cases applied together with the listing before the ground is shaped and rolled into beds.

Fertilizer applications during the growth period are mostly N and are applied via the furrow irrigation system. The amount and type of fertilizer we included in this study are based on an average of what most growers applied.

Irrigation. During germination, irrigation is applied via a sprinkler system. Growers can purchase or rent sprinkler irrigation systems. We calculated costs for this study based on ownership of an existing sprinkler irrigation system.

Growers can irrigate a field one portion at a time, moving pumps, pipes, and fittings manually from field to field. For this study, we assumed that sufficient pumps, pipes, and fittings are available to irrigate 430 acres at a time. Pipes are transported using a trailer and a tractor. Spreading the pipes takes 90 minutes of manual labor per acre. Removing pipes takes about the same amount of time.

After seedlings have broken through the soil, growers convert the irrigation to a furrow system. Irrigation labor for inspection and maintenance of the system is estimated at about 30 minutes per acre per irrigation for sprinklers and about 20 minutes per acre per irrigation for furrow irrigation.

Energy use for pumping includes both diesel fuel and electric power depending on the irrigation system. The amount of diesel and electricity consumption depends on pump horsepower (HP). In our study, we used a 100-HP diesel pump and a 70-HP electric pump. We estimated that 21 gallons per acre of diesel and about 715 kilowatts (KW) of electricity per acre would be needed during the production period for broccoli.

The cost of water to irrigate crops varies greatly from region to region in Ventura County and also depends on whether district or well water is used. In this study, production is in the Oxnard plains where growers use both well and district water. We calculated the water cost at $82 per acre-foot. This rate is a weighted average for pumping costs and district charges, assuming that one-third of the water comes from wells and the remaining two-thirds from districts. Commonly, an irrigation of a broccoli crop uses about 30 acre-inches of water.

Pest and disease management. Insects that can affect broccoli production include cabbage and seedcorn maggots (*Delia* spp.), flea beetles (*Phyllotreta* sp. and *Epitrix cucumeris*), wireworms (*Elateridae* sp.), and cutworms (*Agrostis* sp. and *Peridroma saucia*). Most of these pests can be treated at the larval stage. Growers usually rotate insecticides in order to slow potential pest resistance. Written recommendations from state of California-licensed pest control advisers are required for pesticide use. For information and pesticide use permits, contact your county Agricultural Commissioner's office. You can also obtain pest management information from the University of California on the UC Statewide Integrated Pest Management Project website, http://www.ipm.ucdavis.edu.

Soilborne pests (*Heterodera* spp.) and root knot nematodes (*Meloidogyne* spp.) are an isolated problem and are usually controlled with soil fumigation. In this study, we did not include soilborne pest control. Growers are advised to adjust their management practices, as necessary.

Depending on the region, a number of diseases may infect broccoli during any phase of growth. The most common diseases affecting broccoli in Ventura County are downey mildew *(Pernospora parasitica)* and broccoli head rot caused by *Pseudomonas* bacteria or *Alternaria* sp. fungi. Growers may or may not apply a fungicide to combat these diseases. Usually, treatment of these diseases is only necessary during the early stages of development. Accordingly, this study assumes that fungicide treatment is used as a preventive measure.

HARVEST AND SELL

Because broccoli is grown for both fresh and processed markets, the market price sometimes determines how broccoli is harvested. In this study, we assumed that 60 percent of the crop would be packed for fresh market and 40 percent processed (based on 1997 and 1998 Ventura County Agricultural Commissioner Crop Reports). Most fields are harvested two or three times, the first harvest being larger than subsequent ones.

Broccoli is harvested and packed into cartons. A carton typically contains 14 to 18 bunches of broccoli and weighs about 22 pounds. A bunch contains 2 to 4 heads of broccoli. After it is packed, it is quickly transported to a storage facility where it is palletized and cooled at a scientifically recommended temperature.

Harvesting costs in this study include cartons, picking and packing, loading, and hauling the crop to the nearest cooling facility. Harvesting cost estimates obtained from our interviews include $1.10 for each carton itself (for fresh crop), $1.00 per carton for picking and packing fresh broccoli, $0.50 per carton for picking broccoli for processing, and $0.65 per carton for loading and hauling the crop to fresh market and processing. Selling costs are estimated at $0.50 and $0.25 per carton, respectively, for fresh market and processing.

We did not include cooling costs because we did not get sufficient information on actual costs or usage of cooling facilities.

INTEREST ON OPERATING CAPITAL

We calculated interest on operating capital at a nominal rate of 10 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. A nominal interest rate is the current market cost of borrowed funds during the production year.

DISPOSING OF CROP RESIDUE

After harvest, the field is disced twice to incorporate all crop residues into the soil.

CASH OVERHEAD COSTS

Land rent. Land rental contracts and charges for agricultural production can vary widely by region and also depend on the availability of well water on the property. In Ventura County, if there is a well on the property, the landlord often pays for the pump, the permanent parts of the irrigation facilities, and the costs of maintaining the well. The grower is generally responsible for the costs of energy needed to pump water.

Most of the growers we interviewed rented land with wells that provide a portion of their farms' water requirements. We do not have sufficient data, however, to compare land rents for properties with and without well water. We suggest that growers evaluate the value and costs associated with well water and take this into account when determining an appropriate cost for land rent.

This study assumes an average cash rent of $1,320 per acre per year ($110 per acre per month). Using a 4-month average growth period from land preparation to harvest, the broccoli enterprise is charged a rent of $440 per acre per crop.

Property taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property, including 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.

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 $1,040 per year to cover accidents on the entire farm.

Supervisors, foremen, and management. Interview information indicated that the size of farm we used in this study would require an average of about three employees who are supervisors or foremen. Wages are estimated at $110 per acre per year. For the 4-month growth period, the broccoli enterprise is charged $36 per acre per crop for supervisors and foremen.

Most growers in the survey did not provide management costs, and the wide variations in wages and salaries for professional managers make it difficult to approximate a typical situation. We suggest that, after all production costs have been subtracted from receipts, the residual should be referred to as returns to management.

Office expenses. Expenses in this category include office supplies, telephone service, operating costs for a fax machine, photocopier, and computer, bookkeeping, accounting, legal fees, and so on. Our interview average for office expenses is about $360 per acre per year. For the 4 months of broccoli crop production, office expenses are around $120 per acre per crop.

NON-CASH OVERHEAD COSTS

We calculated the non-cash overhead or ownership costs of assets (including farm equipment and other investments like an irrigation system, buildings, a fuel tank, and pumps) using the capital recovery method. This method helps growers calculate an annual amount of money to charge the enterprise so that the value of assets is recovered within a specified period of time at a designated rate of interest. The rate of interest used to calculate ownership cost is 7.40 percent—California's long-term average return rate 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.

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. Fuel costs are calculated using average (1996 to 1999 period), on-farm delivery prices of $0.72 per gallon for diesel and $1.20 per gallon for gasoline. The cost of energy for electric irrigation pumps is $0.105 per KW.

LABOR

Labor includes owner and hired operator labor with the same wage rate. Hourly labor wages are $7.50 per hour for machine operators and $6.25 per hour for other workers. These wages are averages based on data from the growers we interviewed. Growers also pay 20 to 34 percent for benefits, which include Workers Compensation, Social Security, Medicare insurance, and other possible benefits. In this study, we assumed an additional 34 percent for benefits, which brings the labor rate to about $10.00 per hour for machine operators and $8.40 per hour for other workers.

We calculated 20 percent additional labor time for machinery operation than the time estimated for actual operation. This percentage accounts for the setup, moving, maintenance, and repair of equipment.

Table A. Harvested acreage, average yield, and average prices for broccoli, Ventura County, 1995–1999

Year	Harvested acreage	Cartons per acre*	Price per carton ($)
1995	3,791	566	6.38
1996	4,804	604	6.17
1997	4,454	624	8.20
1998	4,667	585	6.73
1999	4,956	635	6.12
Approximate average	4,534	600	6.70

*One carton equals 22 pounds.

PRICES AND YIELDS

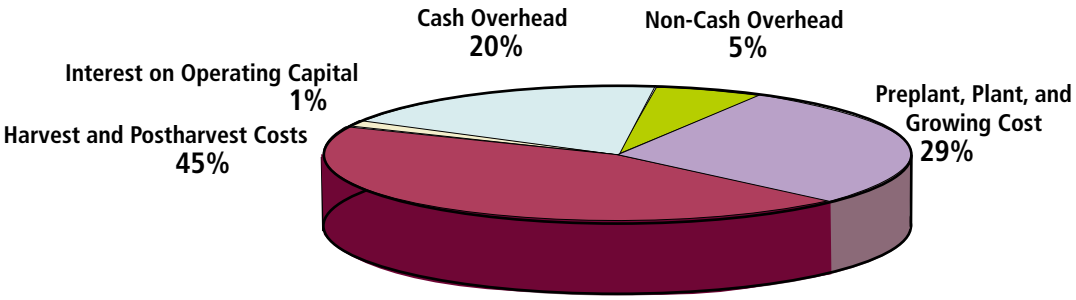
Growers did not provide sufficient data on yield or prices, so we used average prices and yields provided by Ventura County Agricultural Crop Reports for the 1995 to 1999 period (table A) to estimate gross returns. It should be noted that the county prices and yields for broccoli are reported for the total crop (fresh and processed combined). According to the county report, about 60 percent of the crop is packed fresh and 40 percent is processed. The county crop reports use free on board (f.o.b.) prices to estimate growers' returns. These prices include harvesting and packing costs, but growers' prices may be different if they incur postharvest costs such as selling and cooling.

SUMMARY OF COSTS

Our sample estimate of the total cost of broccoli production in Ventura County is $3,340 per acre (tables 1 and 2). Table 1 presents costs by type of activity, and table 2 presents costs by type of input.

The pie graph that follows shows the breakdown of costs. It consists of about 29 percent for land preparation, planting, and growing costs, 45 percent for harvest and postharvest costs, 20 percent for cash overhead, 1 percent for interest on operating capital, and 5 percent for non-cash overhead costs. Land preparation, planting, and growing costs include fuel, lube, and machinery repairs, as well as materials and labor for all production practices. Harvesting costs in this study include the cost of the cartons, picking and packing, loading and hauling to the nearest cooling facility, and selling. Postharvest costs in this study include two discings. Cash overhead costs include land rent, office expenses, liability insurance, supervisor and foremen wages, property taxes, property insurance, and investment repairs.

Figure 1. Proportion of production costs for broccoli, Ventura County, 1999.



PROFITABILITY ANALYSIS

We analyzed profitability using break-even costs per carton and gross and economic margins. Break-even costs allow growers to compare expected market prices with the unit cost of production.

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.

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 costs, are included (and assumed paid) 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.

Given the assumptions upon which we based this cost study, the break-even price for the 5-year county average yield of 600 cartons per acre is estimated at about $5.28 per carton to cover all cash costs and $5.57 per carton to cover total costs (table 4, part A). At the same time, the break-even yield for the county average price of $6.70 per carton is about 472 cartons per acre for cash costs and 499 cartons per acre for total costs. Break-even price is calculated as the cost of production per acre divided by the yield per acre. Break-even yield is calculated as cost of production divided by price per carton.

Gross margin for the county average yield and price is estimated at $855 per acre (table 4, part C). This is calculated as gross returns (price multiplied by yield) minus cash costs of production. Returns to management for the county average yield and price are estimated at $680 per acre (table 4, part D). This figure is calculated as gross returns minus total (cash and non-cash) costs of production.

Crop yield and prices received by growers, however, vary depending on several factors. Prices for broccoli in particular vary based on what proportions of the crop are marketed as fresh and processed. Selling and cooling costs also influence prices, depending on whether the costs are incurred by the grower or by the buyer.

We have provided a range analyses of price and yield variations on profitability so that growers can determine their specific situation. The range analyses include break-even prices at various yield. Gross margins and returns to management are also calculated at various yield and price combinations. The gross margin and returns to management ranges are analyzed at increments of $0.10 per carton for prices and 50 cartons per acre for yield (table 4, parts A through D).

Table 1. Costs per acre to produce broccoli, Ventura County, 1999 (labor rates: $10.00/hr for machine labor, $8.40/hr for non-machine labor; interest rate: 10.00%)

Operation	Operation time (hrs/ac)	Costs per acre ($) Labor cost	Fuel, lube, & repairs	Material cost	Custom/ rent	Total cost	Your cost ($)
Preplant:							
Disc 2×	0.38	5	5	0	0	9	_____
Rip 2×	0.57	7	1	0	0	8	_____
Plow	0.21	3	3	0	0	6	_____
Disc 3×	0.57	7	8	0	0	15	_____
Landplane 3×	0.55	7	6	0	0	13	_____
Chisel	0.25	3	4	0	0	7	_____
List & preplant fertilize	0.33	7	4	66	0	77	_____
Shape beds & roll	0.23	3	2	0	0	5	_____
TOTAL PREPLANT COSTS	**3.09**	**40**	**33**	**66**	**0**	**139**	_____
Plant:							
Seeds (plant & labor)	0.22	3	4	150	0	157	_____
TOTAL PLANT COSTS	**0.22**	**3**	**4**	**150**	**0**	**157**	_____
Growing:							
Weed management 1×	0.21	2	2	83	0	88	_____
Sprinkler setup (machine & labor)	0.20	15	1	0	0	16	_____
Irrigate 5× (sprinkler)	2.25	19	0	36	0	55	_____
Fuel/electricity for irrigation pumps (growing)	0	0	0	27	0	27	_____
Sprinkler removal (machine & labor)	0.20	15	1	0	0	16	_____
Furrow setup (labor)	0.40	3	0	0	0	3	_____
Irrigate 5× (furrow)	1.50	13	0	146	0	159	_____
Electricity for irrigation pump (growing)	0	0	0	63	0	63	_____
Fertilize	0	0	0	64	0	64	_____
Pest management 4×	0.82	10	7	53	0	70	_____
Disease management 2× & pest management 2×	0.41	5	4	64	0	72	_____
Cultivate 2×	0.46	6	5	0	0	10	_____
Pickup truck	1.60	19	8	0	0	27	_____
TOTAL GROWING COSTS	**8.05**	**107**	**26**	**535**	**0**	**669**	_____
Harvest & Sell							
Harvest & sell	0	0	0	1,506	0	1,506	_____
TOTAL HARVEST & SELL COSTS	**0**	**0**	**0**	**1,506**	**0**	**1,506**	_____

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Table 1. *Continued*

Operation	Operation time (hrs/ac)	Costs per acre ($) Labor cost	Fuel, lube, & repairs	Material cost	Custom/ rent	Total cost	Your cost ($)
Disposing of Crop Residue:							
Postharvest disc 2×	0.38	5	5	0	0	9	
TOTAL DISPOSING OF CROP RESIDUE COSTS	**0.38**	**5**	**5**	**0**	**0**	**9**	
Interest on operating capital @ 10.00%						33	
TOTAL OPERATING COSTS/ACRE		**154**	**68**	**2,258**	**0**	**2,513**	
Cash Overhead:							
Land rent						440	
Office expense						120	
Liability insurance						0	
Supervisors & foreman						36	
Property taxes						6	
Property insurance						4	
Investment repairs						45	
TOTAL CASH OVERHEAD COSTS						**652**	
TOTAL CASH COSTS/ACRE						**3,165**	

	Costs per producing acre ($)	Annual cost: capital recovery ($)	Total cost ($)	Your cost ($)
Non-cash Overhead:				
Investment				
Shop building	23	3	3	
Shop tools	12	1	1	
Fuel tanks & pumps	15	2	2	
Irrigation pump	333	46	46	
Sprinklers and pipes	549	76	76	
Equipment	193	49	49	
TOTAL NON-CASH OVERHEAD COSTS	**1,125**	**176**	**176**	
TOTAL COSTS/ACRE			**3,340**	

Table 2. Costs and returns per acre to produce broccoli, Ventura County, 1999 (labor rates: $10.00/hr for machine labor, $8.40/hr for non-machine labor; interest rate: 10.00%)

	Quantity per acre	Unit	Price or cost per unit ($)	Value or cost per acre ($)	Your cost ($)
Gross Returns	**600.00**	**carton**	**6.70**	**4,020**	_____
TOTAL GROSS RETURNS FOR BROCCOLI				**4,020**	_____
Operating Costs:					
Fertilize:					
16-20-0 (preplant)	400.00	pound	0.165	66	_____
AN 20 (growing)	50.00	gallon	1.05	64	_____
Seed:					
Broccoli seed	0.80	pound	188.00	150	_____
Weed management	1.00	acre	83.00	83	_____
Water:					
Water	26.65	acre-inch	6.83	182	_____
Fuel (pump):					
Booster pump fuel	21.00	gallon	0.72	15	_____
Electricity (pump):					
Low-pressure pump	715.23	KW	0.105	75	_____
Pest management	1.00	acre	98.00	98	_____
Disease management	1.00	acre	17.00	17	_____
Harvest & Sell:					
Cartons	360.00	carton	1.10	396	_____
Pick & pack (fresh)	360.00	carton	1.00	360	_____
Load & haul	600.00	carton	0.65	390	_____
Pick (process)	240.00	carton	0.50	120	_____
Selling (fresh)	360.00	carton	0.50	180	_____
Selling (processed)	240.00	carton	0.25	60	_____
Labor (machine)	9.12	hour	10.00	91	_____
Labor (non-machine)	7.47	hour	8.40	63	_____
Fuel:					
Gasoline	4.00	gallon	1.20	5	_____
Diesel	39.62	gallon	0.72	29	_____
Lube				5	
Machinery repair				29	_____
Interest on operating capital @ 10.00%				33	_____
TOTAL OPERATING COSTS/ACRE				**2,513**	_____
NET RETURNS ABOVE OPERATING COSTS				**1,507**	_____

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Table 2. *Continued*

	Quantity per acre	Unit	Price or cost per unit ($)	Value or cost per acre ($)	Your cost ($)
Cash Overhead Costs:					
Land rent				440	
Office expense				120	
Liability insurance				0	
Supervisors & foreman				36	
Property taxes				6	
Property insurance				4	
Investment repairs				45	
TOTAL CASH OVERHEAD COSTS/ACRE				**652**	
TOTAL CASH COSTS/ACRE				**3,165**	
Non-cash Overhead Costs (Capital Recovery):					
Shop building				3	
Shop tools				1	
Fuel tanks & pumps				2	
Irrigation pump				46	
Sprinklers & pipes				76	
Equipment				49	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				**176**	
TOTAL COSTS/ACRE				**3,340**	
NET RETURNS ABOVE TOTAL COSTS				**680**	

Table 3. Monthly cash costs per acre to produce broccoli, Ventura County, 1999

	Costs per acre ($)				
Operation	**Month 1**	**Month 2**	**Month 3**	**Month 4**	**Total**
Preplant:					
Disc 2×	9				9
Rip 2×	8				8
Plow	6				6
Disc 3×	15				15
Landplane 3×	13				13
Chisel	7				7
Listing & preplant fertilize	77				77
Shape beds & roll	5				5
TOTAL PREPLANT COSTS	**139**				**139**
Plant:					
Seeds (plant & labor)		157			157
TOTAL PLANT COSTS		**157**			**157**
Growing:					
Weed management 1×		88			88
Sprinkler setup (machine & labor)		16			16
Irrigate 5× (sprinkler)		55			55
Fuel/electricity for irrigation pumps (growing)		27			27
Sprinkler removal (machine & labor)		16			16
Furrow setup (labor)		3			3
Irrigate 5× (furrow)		32	64	64	159
Electricity for irrigation pump (growing)		10	26	26	63
Fertilize			38	26	64
Pest management 4×		31	39		70
Disease management 2× & pest management 2×			27	45	72
Cultivate 2×		5	5		10
Pickup truck	7	7	7	7	27
TOTAL GROWING COSTS	**7**	**289**	**205**	**168**	**669**
Harvest & Sell:					
Harvest & sell				1,506	1,506
TOTAL HARVEST & SELL COSTS				**1,506**	**1,506**
Disposing of Crop Residue:					
Postharvest disc 2×				9	9
TOTAL DISPOSING OF CROP RESIDUE COSTS				**9**	**9**
Interest on operating capital @ 10.00%	1	5	7	21	33
TOTAL OPERATING COSTS/ACRE	**147**	**451**	**211**	**1,704**	**2,513**
Cash Overhead:					
Land rent	110	110	110	110	440
Office expense	30	30	30	30	120
Liability insurance	0	0	0	0	0
Supervisors & foreman	9	9	9	9	36
Property taxes	3			3	6
Property insurance	2			2	4
Investment repairs	11	11	11	11	45
TOTAL CASH OVERHEAD COSTS	**166**	**160**	**160**	**166**	**652**
TOTAL CASH COSTS/ACRE	**313**	**611**	**371**	**1,870**	**3,165**

Table 4. Range analyses of broccoli production costs and returns, Ventura County, 1999

	Costs per acre ($) for various cartons-per-acre yields						
	450	500	550	600	650	700	750
Part A. Costs per Acre and per Carton at Varying Yields							
Operating costs/acre:							
Preplant cost	139	139	139	139	139	139	139
Plant cost	157	157	157	157	157	157	157
Growing cost	669	669	669	669	669	669	669
Harvest & sell cost	1,129	1,255	1,380	1,506	1,631	1,757	1,882
Disposing of crop residue cost	9	9	9	9	9	9	9
Interest on operating capital	30	31	32	33	34	36	37
TOTAL OPERATING COSTS/ACRE	**2,133**	**2,260**	**2,386**	**2,513**	**2,639**	**2,766**	**2,892**
TOTAL OPERATING COSTS/CARTON	**4.74**	**4.52**	**4.34**	**4.19**	**4.06**	**3.95**	**3.86**
CASH OVERHEAD COSTS/ACRE	**652**	**652**	**652**	**652**	**652**	**652**	**652**
TOTAL CASH COSTS/ACRE	**2,785**	**2,911**	**3,038**	**3,165**	**3,291**	**3,418**	**3,544**
TOTAL CASH COSTS/CARTON	**6.19**	**5.82**	**5.52**	**5.27**	**5.06**	**4.88**	**4.73**
NON-CASH OVERHEAD COSTS/ACRE	**176**	**176**	**176**	**176**	**176**	**176**	**176**
TOTAL COSTS/ACRE	**2,961**	**3,087**	**3,214**	**3,340**	**3,467**	**3,593**	**3,720**
TOTAL COSTS/CARTON	**6.58**	**6.17**	**5.84**	**5.57**	**5.33**	**5.13**	**4.96**
Part B. Returns per Acre above Operating Costs							
Price ($/carton):							
$6.40	747	940	1,134	1,327	1,521	1,714	1,908
$6.50	792	990	1,189	1,387	1,586	1,784	1,983
$6.60	837	1,040	1,244	1,447	1,651	1,854	2,058
$6.70	882	1,090	1,299	1,507	1,716	1,924	2,133
$6.80	927	1,140	1,354	1,567	1,781	1,994	2,208
$6.90	972	1,190	1,409	1,627	1,846	2,064	2,283
$7.00	1,017	1,240	1,464	1,687	1,911	2,134	2,358
Part C. Returns per Acre above All Cash Costs (gross margin)							
Price ($/carton):							
$6.40	95	289	482	675	869	1,062	1,256
$6.50	140	339	537	735	934	1,132	1,331
$6.60	185	389	592	795	999	1,202	1,406
$6.70	230	439	647	855	1,064	1,272	1,481
$6.80	275	489	702	915	1,129	1,342	1,556
$6.90	320	539	757	975	1,194	1,412	1,631
$7.00	365	589	812	1,035	1,259	1,482	1,706
Part D. Returns per Acre above Total Costs (returns to management)							
Price ($/carton):							
$6.40	–81	113	306	500	693	887	1,080
$6.50	–36	163	361	560	758	957	1,155
$6.60	9	213	416	620	823	1,027	1,230
$6.70	54	263	471	680	888	1,097	1,305
$6.80	99	313	526	740	953	1,167	1,380
$6.90	144	363	581	800	1,018	1,237	1,455
$7.00	189	413	636	860	1,083	1,307	1,530

Table 5. Farm equipment and investment values and annual costs based on 2,600 annual farmed acres, Ventura County, 1999

Equipment	Value: 1999 price ($)	Life (yrs)	Salvage value ($)	Costs			
				Capital recovery ($)	Annual cash overhead ($)		Total annual costs ($)
					Insurance	Taxes	
120 HP Tractor 4WD (#1)	75,180	6	7,518	14,927	295	413	15,636
120 HP Tractor 4WD (#2)	75,180	5	7,518	17,236	295	413	17,944
120 HP Tractor 4WD (#3)	75,180	6	7,518	14,927	295	413	15,636
200 HP 4WD Tractor	135,500	6	13,550	26,904	531	745	28,181
45 HP 2WD Tractor	23,030	10	2,303	3,176	90	127	3,393
Bed shaper	8,900	3	890	3,140	35	49	3,224
Chisel – 14' (#1)	2,270	3	227	801	9	12	822
Chisel – 14' (#2)	2,270	3	227	801	9	12	822
Cultivator – 4-row 40" (#1)	7,130	3	713	2,516	28	39	2,583
Cultivator – 4-row 40" (#2)	7,130	3	713	2,516	28	39	2,583
Disc – 21' (#1)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#2)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#3)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#4)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#5)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#6)	16,510	5	1,651	3,785	65	91	3,941
Disc – 21' (#7)	16,510	5	1,651	3,785	65	91	3,941
Lister (#1)	6,000	4	600	1,653	24	33	1,710
Lister (#2)	6,000	4	600	1,653	24	33	1,710
Pickup truck 1/2 ton (#1)	17,160	2	1,716	8,716	67	94	8,878
Pickup truck 1/2 ton (#2)	17,160	2	1,716	8,716	67	94	8,878
Pickup truck 1/2 ton (#3)	17,160	2	1,716	8,716	67	94	8,878
Pickup truck 1/2 ton (#4)	17,160	2	1,716	8,716	67	94	8,878
Pickup truck 1/2 ton (#5)	17,160	2	1,716	8,716	67	94	8,878
Planter – 6-row	8,900	5	890	2,040	35	49	2,124
Plow – 6-bottom	12,000	3	180	4,550	43	61	4,655
Sprayer 600 gallon (#1)	100,000	5	10,000	22,926	392	550	23,868
Sprayer 600 gallon (#2)	100,000	5	10,000	22,926	392	550	23,868
Subsoiler – 12' (#1)	6,490	2	649	3,297	25	36	3,358
Subsoiler – 12' (#2)	6,490	2	649	3,297	25	36	3,358
Trailer	2,000	2	200	1,016	8	11	1,035
Triplane – 14' (#1)	18,230	5	1,823	4,179	71	100	4,351
Triplane – 14' (#2)	18,230	5	1,823	4,179	71	100	4,351
Triplane – 14' (#3)	18,230	5	1,823	4,179	71	100	4,351
TOTAL EQUIPMENT	**915,710**		**90,551**	**232,916**	**3,587**	**5,031**	**241,535**
60% OF NEW COST*	**549,426**		**54,331**	**139,750**	**2,152**	**3,019**	**144,921**

Continued next page

Table 5. *Continued*

Investment	Value: 1999 price ($)	Life (yrs)	Salvage value ($)	Costs				
				Capital recovery ($)	Annual cash overhead ($)			Total annual costs ($)
					Insurance	Taxes	Repairs	
Fuel tanks & pumps	38,100	15	3,810	4,142	149	210	1,828	6,329
Irrigation pump	866,666	10	86,667	119,529	3,399	4,767	41,599	169,293
Shop building	60,000	15	6,000	6,524	235	330	2,880	9,969
Shop tools	30,000	15	3,000	3,262	118	165	1,440	4,984
Sprinklers & pipes	1,427,530	10	142,753	196,883	5,598	7,851	68,521	278,853
TOTAL INVESTMENT	**2,422,296**		**242,230**	**330,340**	**9,499**	**13,323**	**116,268**	**469,429**

Business Overhead	Enterprise/ farm size	Unit	Price per unit ($)	Total cost ($)
Land rent	2,600	acre	440	1,144,000
Liability insurance	2,600	acre	0.40	1,040
Office expense	2,600	acre	120	312,000
Supervisors & foreman	2,600	acre	36	93,600

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

Table 6. Farm equipment actual hours of use and hourly costs based on 2,600 annual farmed acres, Ventura County, 1999

Description	Actual hours of use	Costs per hour ($)					
		Capital recovery	Cash overhead		Operating		Total costs per hour
			Insurance	Taxes	Repairs	Fuel & lube	
120 HP Tractor 4WD (#1)	2,500	3.58	0.07	0.10	1.89	5.77	11.41
120 HP Tractor 4WD (#2)	3,000	3.45	0.06	0.08	1.91	5.77	11.27
120 HP Tractor 4WD (#3)	2,500	3.58	0.07	0.10	1.89	5.77	11.41
200 HP 4WD Tractor	2,600	6.21	0.12	0.17	3.54	9.61	19.65
45 HP 2WD Tractor	1,200	1.59	0.05	0.06	1.03	1.83	4.55
Bed shaper	670	2.81	0.03	0.04	1.53	0	4.42
Chisel – 14' (#1)	740	0.65	0.01	0.01	0.44	0	1.11
Chisel – 14' (#2)	740	0.65	0.01	0.01	0.44	0	1.11
Cultivator – 4-row 40" (#1)	740	2.04	0.02	0.03	1.39	0	3.49
Cultivator – 4-row 40" (#2)	740	2.04	0.02	0.03	1.39	0	3.49
Disc – 21' (#1)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#2)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#3)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#4)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#5)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#6)	500	4.54	0.08	0.11	3.65	0	8.38
Disc – 21' (#7)	500	4.54	0.08	0.11	3.65	0	8.38
Lister (#1)	500	1.98	0.03	0.04	2.60	0	4.65
Lister (#2)	500	1.98	0.03	0.04	2.60	0	4.65
Pickup truck 1/2 ton (#1)	1,000	5.23	0.04	0.06	1.29	3.45	10.06
Pickup truck 1/2 ton (#2)	1,000	5.23	0.04	0.06	1.29	3.45	10.06
Pickup truck 1/2 ton (#3)	1,000	5.23	0.04	0.06	1.29	3.45	10.06
Pickup truck 1/2 ton (#4)	1,000	5.23	0.04	0.06	1.29	3.45	10.06
Pickup truck 1/2 ton (#5)	1,000	5.23	0.04	0.06	1.29	3.45	10.06
Planter – 6-row	500	2.45	0.04	0.06	1.97	0	4.52
Plow – 6-bottom	610	4.48	0.04	0.06	1.82	0	6.40
Sprayer 600 gallon (#1)	2,000	6.88	0.12	0.17	4.80	3.31	15.27
Sprayer 600 gallon (#2)	2,000	6.88	0.12	0.17	4.80	3.31	15.27
Subsoiler – 12' (#1)	840	2.35	0.02	0.03	1.28	0	3.68
Subsoiler – 12' (#2)	840	2.35	0.02	0.03	1.28	0	3.68
Trailer	1,000	0.61	0.01	0.01	0.35	0	0.97
Triplane – 14' (#1)	540	4.64	0.08	0.11	2.74	0	7.57
Triplane – 14' (#2)	540	4.64	0.08	0.11	2.74	0	7.57
Triplane – 14' (#3)	540	4.64	0.08	0.11	2.74	0	7.57

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