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Spinach 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 fresh market spinach developed in Ventura County, 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 production practice and cost information 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 we used in this study is provided in the text. Cultural practice and cost data are presented in detail in six tables:

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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 several times a year, so 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 acres of farmed land 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, as well as overhead expenses—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 (five times in this study), ripping the soil (maybe twice) to break up any underlying compacted soil, plowing, leveling using a triplane, chiseling, furrowing, listing, and shaping beds. Preplant fertilizer is applied together with the listing before the ground is shaped and rolled into beds.

Stand establishment. Spinach is grown primarily in the southern desert valleys, the south coast, the central coast, and the central San Joaquin Valley. The primary varieties produced in Ventura County are St. Helens, Rushmore, and Springfield, all of which require similar cultural, harvesting, and marketing techniques.

Seeding rates vary depending on spacing. For this study, we assumed a rate of approximately 1 million seeds per acre. Seeds are planted six rows to a bed with bed centers 40 inches apart and seeds 1 inch apart within a row at a depth of ½ inch.

Weed management. Many growers in Ventura County use cultivation and preemergence herbicides to control a wide range of grass and broadleaf weeds. Spinach is quite vulnerable to weed infestations during the seedling stage. Weeds common to spinach include stinging nettle (*Urtica urens*), annual bluegrass (*Poa annua*), sowthistle (*Sonchus oleraceus*), and prickly lettuce (*Latuca serriola*) as well as others not mentioned in this text.

Fertilization. As mentioned previously, preplant fertilizer of nitrogen (N) and phosphorous is in most cases applied together with 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 switch the irrigation to a furrow system. Irrigation labor for inspection of the system and maintenance 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 of diesel and 252 kilowatts (KW) of electricity would be needed per acre during the production period of spinach.

The cost of water to irrigate crops varies greatly from region to region in Ventura County, and also depending on whether district or well water is used. The farm in this study 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. Irrigation in spinach crop production commonly runs about 12 acre-inches of water.

Pest and disease management. Most of the insects that can affect spinach production are leafminers, and most of them can be treated at the larval stage. Growers usually rotate insecticides in order to slow potential pest resistance, depending on the region. Written recommendations from State of California-licensed pest control advisors are required for pesticide use. For information and pesticide use permits, contact your local 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.

A number of diseases may infect spinach during any phase of growth. In Ventura County, the most common diseases affecting spinach are downy mildew, cucumber mosaic virus (CMV), and beet western yellows virus (BWYV). This study assumes the application of a preventative fungicide treatment.

HARVEST AND SELL

The spinach crop is field-packed into cartons. A carton typically contains about 14 to 18 bunches of spinach and has an overall weight of about 20 pounds. A bunch contains 8 to 12 plants. After the spinach crop is packed, it is quickly transported to a storage facility where it is cooled and palletized at scientifically recommended temperatures.

Harvesting costs in this study include the cost of cartons, picking and packing, loading, and hauling to the nearest cooling facility. We estimated a cost of $1.20 for the carton itself, $1.00 per carton for picking and packing, and $0.65 per carton for loading and hauling. Selling costs are estimated at $0.50 per carton. 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 range 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 generally is responsible for the costs of energy needed to pump the 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 rent 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 three-month average growth period from land preparation to harvest, the spinach enterprise is charged a rent of $330 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 three months growth period, the spinach enterprise is charged $27 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, once all production costs have been subtracted from receipts, the residual should be referred to as returns to management.

Office expenses. The office expenses category covers 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 three months of spinach crop production, office expenses are around $90 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 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 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, nonmachine 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 or non-machine workers.

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

Table A. Havested acreage, average yield, and average prices for spinach, Ventura County, 1995–1999

Year	Harvested acreage	Cartons per acre*	Price per carton ($)
1995	1,317	625	5.86
1996	1,493	619	6.27
1997	1,462	563	6.37
1998	1,273	562	7.32
1999	1,807	640	6.39
Approximate average	1,470	600	6.40

*One carton equals 20 pounds.

PRICES AND YIELDS

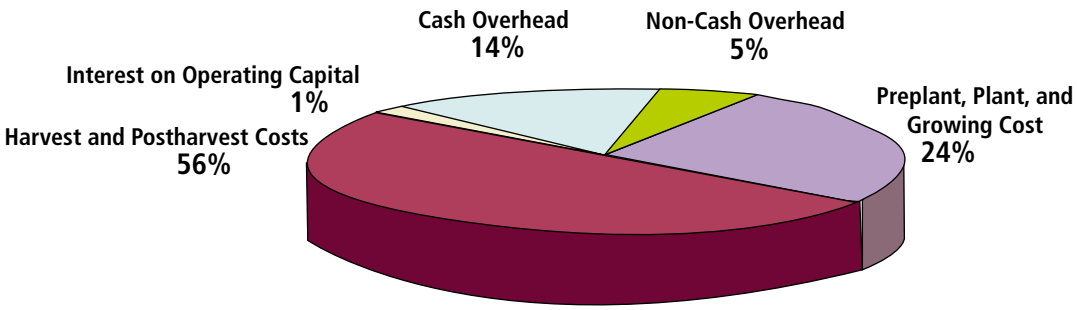
Growers did not provide sufficient data on yield or prices, so we used average prices and yields provided by Ventura County Agricultural Commissioner Crop Reports for the 1995 to 1999 period (table A) to estimate gross returns. The county crop reports use free on board (f.o.b.) prices to estimate growers' 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 spinach production in Ventura County is $3,604 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 below shows the breakdown of costs. It consists of about 24 percent for land preparation, planting, and growing costs, 56 percent for harvest and postharvest costs, 14 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 carton, picking and packing, loading, and hauling to the nearest cooling facility, and selling. Postharvest cost 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 spinach, Ventura County, 1999.



PROFITABILITY ANALYSIS

We analyzed profitability using breakeven costs per carton and gross and economic margins. Breakeven 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 breakeven price for the five years county average yield of 600 cartons per acre is estimated at about $5.72 per carton to cover all cash costs and $6.01 per carton to cover total costs (table 4 part A). On the other hand, the breakeven *yield* for the county average price of $6.40 per carton is about 536 cartons per acre for cash costs and 563 cartons per acre for total costs. Breakeven 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 $407 per acre (table 4 part C). This is calculated as gross returns (price times yield) minus cash costs of production. Returns to management for the county average yield and price are estimated at $236 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 from individual to individual. Selling and cooling costs in particular influence prices depending on whether the costs are incurred by the grower or by the buyer.

We have provided 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 prices at various yields as well as gross margins and returns to management 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 spinach, 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 2x	0.38	5	5	0	0	9	
Rip 2x	0.57	7	1	0	0	8	
Plow	0.21	3	3	0	0	6	
Disc 3x	0.57	7	8	0	0	15	
Landplane 3x	0.55	7	6	0	0	13	
Chisel	0.25	3	4	0	0	7	
Listing & pre-plant 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	258	0	264	
TOTAL PLANT COSTS	**0.22**	**3**	**4**	**258**	**0**	**264**	
Growing:							
Sprinkler setup (machine & labor)	0.20	15	1	0	0	16	
Irrigate 5x (sprinkler)	2.25	19	0	36	0	55	
Fuel/electricity for irrigation pumps (growing)	0	0	0	27	0	27	
Weed management 2x	10.00	84	0	63	0	147	
Sprinkler removal (machine & labor)	0.20	15	1	0	0	16	
Furrow setup (labor)	0.40	3	0	0	0	3	
Irrigate 3x (furrow)	0.90	8	0	41	0	49	
Electricity for irrigation pumps (growing)	0	0	0	14	0	14	
Fertilize	0	0	0	42	0	42	
Disease management 1x	0.21	2	2	34	0	38	
Pest management 3x	0.62	7	6	18	0	31	
Cultivate 2x	0.46	6	5	0	0	10	
Pickup truck	1.60	19	8	0	0	27	
TOTAL GROWING COSTS	**16.84**	**178**	**21**	**275**	**0**	**475**	
Harvest & Sell							
Harvest & sell	0	0	0	2,010	0	2,010	
TOTAL HARVEST & SELL COSTS	**0**	**0**	**0**	**2,010**	**0**	**2,021**	

Continued

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		**225**	**62**	**2,609**	**0**	**2,930**	
Cash Overhead:							
Land rent						330	
Office expense						90	
Liability insurance						0	
Supervisors & foreman						27	
Property taxes						6	
Property insurance						4	
Investment repairs						45	
TOTAL CASH OVERHEAD COSTS						**503**	
TOTAL CASH COSTS/ACRE						**3,433**	

	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 & pipes	549	76	76	
Equipment	175	44	44	
TOTAL NON-CASH OVERHEAD COSTS	**1,106**	**171**	**171**	
TOTAL COSTS/ACRE			**3,604**	

Table 2. Costs and returns per acre to produce spinach, 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**	**6.40**	**3,840**	
TOTAL GROSS RETURNS FOR SPINACH				**3,840**	
Operating Costs:					
Fertilize:					
16-20-0 (preplant)	400.00	pound	0.165	66	
AN 20 (growing)	40.00	gallon	1.05	42	
Seed:					
Spinach seed	25.00	pound	10.32	258	
Water:					
Water	11.25	acre-inch	6.83	77	
Fuel (pump):					
Booster pump fuel	21.00	gallon	0.72	15	
Electricity (pump):					
Low-pressure pump	252.00	KW	0.105	26	
Weed management	1.00	acre	63.00	63	
Disease management	1.00	acre	34.00	34	
Pest management	1.00	acre	18.00	18	
Harvest & sell:					
Cartons	600.00	carton	1.20	720	
Pick & pack	600.00	carton	1.00	600	
Load & haul	600.00	carton	0.65	390	
Selling	600.00	carton	0.50	300	
Labor (machine)	8.38	hour	10.00	84	
Labor (non-machine)	16.87	hour	8.40	142	
Fuel					
Gasoline	4.00	gallon	1.20	5	
Diesel	36.90	gallon	0.72	27	
Lube				5	
Machinery repair				26	
Interest on operating capital @ 10.00%				33	
TOTAL OPERATING COSTS/ACRE				**2,930**	
NET RETURNS ABOVE OPERATING COSTS				**910**	

Continued

Table 2. *Continued*

	Quantity per acre	Unit	Price or cost per unit ($)	Value or cost per acre ($)	Your cost ($)
Cash Overhead Costs:					
Land rent				330	_____
Office expense				90	_____
Liability insurance				0	_____
Supervisors & foreman				27	_____
Property taxes				6	_____
Property insurance				4	_____
Investment repairs				45	_____
TOTAL CASH OVERHEAD COSTS/ACRE				**503**	_____
TOTAL CASH COSTS/ACRE				**3,433**	_____
Non-cash Overhead Costs (Capital Recovery):					
Shop building				3	_____
Shop tools				1	_____
Fuel tanks & pumps				2	_____
Irrigation pump				46	_____
Sprinklers & pipes				76	_____
Equipment				44	_____
TOTAL NON-CASH OVERHEAD COSTS/ACRE				**171**	_____
TOTAL COSTS/ACRE				**3,604**	_____
NET RETURNS ABOVE TOTAL COSTS				**236**	_____

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

	Costs per acre ($)			
Operation	**Month 1**	**Month 2**	**Month 3**	**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)	264			264
TOTAL PLANT COSTS	**264**			**264**
Growing:				
Sprinkler setup (machine & labor)		16		16
Irrigate 5x (sprinkler)		55		55
Fuel/electricity for irrigation pumps (growing)		27		27
Weed management		63	84	147
Sprinkler removal (machine & labor)		16		16
Furrow setup (labor)		3		3
Irrigate 3x (furrow)		9	39	49
Electricity for irrigation pumps (growing)		2	12	14
Fertilize		10	31	42
Disease management 1x			38	38
Pest management 3x		13	18	31
Cultivate 2x		5	5	10
Pickup truck	9	9	9	27
TOTAL GROWING COSTS	**9**	**230**	**236**	**475**
669				
Harvest & Sell:				
Harvest & sell			2,010	2,010
TOTAL HARVEST & SELL COSTS			**2,010**	**2,010**
Disposing of Crop Residue:				
Postharvest disc 2×			9	9
TOTAL DISPOSING OF CROP RESIDUE COSTS			**9**	**9**
Interest on operating capital @ 10.00%	3	5	24	33
TOTAL OPERATING COSTS/ACRE	**416**	**235**	**2,280**	**2,930**

Continued

Table 3. *Continued*

Operation	Costs per acre ($)			
	Month 1	Month 2	Month 3	Total
Cash Overhead:				
Land rent	110	110	110	330
Office expense	30	30	30	90
Liability insurance	0	0	0	0
Supervisors & foreman	9	9	9	27
Property taxes	3		3	6
Property insurance	2		2	4
Investment repairs	15	15	15	45
TOTAL CASH OVERHEAD COSTS	**169**	**164**	**169**	**503**
TOTAL CASH COSTS/ACRE	**585**	**399**	**2,449**	**3,433**

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

	Costs per acre ($) for various cartons-per-acre yields						
	450	500	550	600	650	700	750
Part A. Costs per Acre and per Carton at Varying Yields							
Operating costs/acre:							
Preplant cost	139	139	139	139	139	139	139
Plant cost	264	264	264	264	264	264	264
Growing cost	475	475	475	475	475	475	475
Harvest & sell cost	1,507	1,675	1,843	2,018	2,178	2,345	2,513
Disposing of crop residue cost	9	9	9	9	9	9	9
Interest on operating capital	29	30	31	33	34	36	37
TOTAL OPERATING COSTS/ACRE	**2,423**	**2,592**	**2,761**	**2,930**	**3,099**	**3,268**	**3,437**
TOTAL OPERATING COSTS/CARTON	**5.39**	**5.18**	**5.02**	**4.88**	**4.77**	**4.67**	**4.58**
CASH OVERHEAD COSTS/ACRE	**503**	**503**	**503**	**503**	**503**	**503**	**503**
TOTAL CASH COSTS/ACRE	**2,926**	**3,095**	**3,264**	**3,433**	**3,601**	**3,770**	**3,939**
TOTAL CASH COSTS/CARTON	**6.50**	**6.19**	**5.93**	**5.72**	**5.54**	**5.39**	**5.25**
NON-CASH OVERHEAD COSTS/ACRE	**171**	**171**	**171**	**171**	**171**	**171**	**171**
TOTAL COSTS/ACRE	**3,097**	**3,266**	**3,435**	**3,604**	**3,773**	**3,942**	**4,111**
TOTAL COSTS/CARTON	**6.88**	**6.53**	**6.25**	**6.01**	**5.80**	**5.63**	**5.48**
Part B. Returns per Acre above Operating Costs							
Price ($/carton):							
$6.10	322	458	594	730	866	1,002	1,138
$6.20	367	508	649	790	931	1,072	1,213
$6.30	412	558	704	850	996	1,142	1,288
$6.40	457	608	759	910	1,061	1,212	1,363
$6.50	502	658	814	970	1,126	1,282	1,438
$6.60	547	708	869	1,030	1,191	1,352	1,513
$6.70	592	758	924	1,090	1,256	1,422	1,588
Part C. Returns per Acre above All Cash Costs (gross margin)							
Price ($/carton):							
$6.10	–181	–45	91	227	364	500	636
$6.20	–136	5	146	287	429	570	711
$6.30	–91	55	201	347	494	640	786
$6.40	–46	105	256	407	559	710	861
$6.50	–1	155	311	467	624	780	936
$6.60	44	205	366	527	689	850	1,011
$6.70	89	255	421	587	754	920	1,086
Part D. Returns per Acre above Total Costs (returns to management)							
Price ($/carton):							
$6.10	–352	–216	–80	56	192	328	464
$6.20	–307	–166	–25	116	257	398	539
$6.30	–262	–116	30	176	322	468	614
$6.40	–217	–66	85	236	387	538	689
$6.50	–172	–16	140	296	452	608	764
$6.60	–127	34	195	356	517	678	839
$6.70	–82	84	250	416	582	748	914

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**

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

Continued

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	330	858,000
Liability insurance	2,600	acre	0.40	1,040
Office expense	2,600	acre	90	234,000
Supervisors & foreman	2,600	acre	27	70,200

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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