
University of California Agriculture and Natural Resources
Cooperative Extension and Agricultural Issues Center
UC Davis Department of Agricultural and Resource Economics

2016

SAMPLE COSTS TO PRODUCE AND HARVEST STRAWBERRIES



CENTRAL COAST REGION

Santa Cruz & Monterey Counties

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Central Coast Region - Santa Cruz & Monterey Counties - 2016**

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INTRODUCTION

The sample costs to produce and harvest strawberries in the Central Coast Region – Santa Cruz and Monterey counties – are presented in this study. The study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. The practices described are based on production procedures considered typical for this crop and area, and will not apply to every farm. Sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Cost*”, is provided to enter your actual costs on Tables 1 and 2.

The hypothetical farm operation, production practices, overhead, and calculations are described under assumptions. For additional information or explanation of calculations in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-4651, UC Cooperative Extension Santa Cruz County: Mark Bolda (831) 763-8025 or Laura Tourte (831) 763-8005, or the UC Cooperative Extension office in your county.

Sample Cost of Production studies for many commodities are available and can be downloaded from the website <http://coststudies.ucdavis.edu>. Archived studies are also available on the website.

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ASSUMPTIONS

The following assumptions refer to Tables 1 to 6 and pertain to sample costs to produce strawberries in the Central Coast Region - Santa Cruz and Monterey counties. The cultural practices described and materials used are considered typical for a well-managed strawberry operation in the region. The costs, materials and practices will not apply to all situations every production year. Cultural practices and costs for the production of strawberries vary by grower and region, and can be significant. The study is intended as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

Farm. This study assumes a farm operation size of 50 contiguous acres of rented land. Strawberries are planted on 45 acres; roads, the irrigation system, and on-farm buildings account for the remaining five acres. The grower rents the land, which is assumed to be fairly flat. Strawberries may also be planted on rolling hills or sloped land in the area. This may necessitate erosion prevention and control measures, as well as practices and equipment that differ from those used in this study; differing practices or equipment are not included here. Strawberries are often grown on land that was planted previously to vegetable crops in a strawberry – vegetable rotation.

Production Cultural Practices and Material Inputs

Land Preparation, Pre-Plant Fertilization, and Pre-Plant Irrigation. Prior to land preparation, and to help determine fertilization practices, two soil samples per 45 acres are taken for analysis. Strawberry ground is then disced a total of six times, subsoiled twice, chiseled twice and then sprinkler irrigated using 0.5 acre-inches of water to slightly moisten the soil for fumigation (please see Fumigation and Alternatives section). After fumigation, the soil is further moistened with an additional 0.5 acre-inches of water, and then beds are listed and shaped. A slow release 18-8-13 fertilizer at 500 pounds per acre or a different complete fertilizer is drilled pre-plant into the beds at the same time as shaping. Drip irrigation tape (two lines per bed) is installed, and beds are covered with a plastic mulch using a mulch laying implement.

Plant Establishment. Prior to planting, a slotting implement is used to open the plastic mulch at appropriate intervals for transplants. Several strawberry varieties such as Albion, Monterey, Cabrillo and a number of proprietary varieties are suitable for production in the region, but no specific variety is assumed in this study. For this study strawberries are planted on 48-inch beds, two rows per bed at 12-inch plant spacing for a total of 21,780 plants per acre. Typically, five percent of the field, or 1,089 plants per acre is replanted in the weeks and months that follow because of poor planting and field conditions; it is included in the establishment costs. Planting takes approximately 50 hours per acre. Some growers use different bed widths and plant spacings; management practices may then also differ to accommodate production and harvest needs.

Post-Plant Fertilization. From March to September CAN 17 or another complete fertilizer such as 15-15-15, ammonium sulfate or 6-30-30 is applied through the drip system. Grower fertilizer programs and timing vary widely, but most will use a complete or NPK fertilizer and nitrogen (N) fertilizers, depending upon seasonal nutrient requirements.

Post-Plant Irrigation. Immediately after planting strawberries are sprinkler irrigated each day for one week, and as needed on alternate days for another week using a total of 2.5 acre-inches of water. From March to September (seven months), strawberries are drip irrigated two to three times per week through the drip lines using a total of 24 acre-inches. A total of 27.5 acre-inches of water are used for the season. Effective rainfall is not taken into account. Water cost is estimated at \$270 per acre-foot or \$22.50 per acre-inch. The amount and cost of water can differ substantially from farm to farm in the area depending on climatic conditions, soil type, well depth, and irrigation district.

Pest Management. The pesticides and rates mentioned in this cost study are listed in the *UC IPM Pest Management Guidelines, Strawberries*. For more information on pesticides, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu, or contact your local UCCE farm advisor. Pesticide use permits and regulatory information are available through your local agricultural commissioner's office. Pesticides mentioned in this study are used to calculate rates and costs; applications, timing and materials vary according to pest pressure. Adjuvants are recommended for many pesticides for effective control and are not included here. The pesticide program shown in Table A represents a typical program for the region but can vary considerably; effectiveness of practices depends upon field and environmental conditions.

Pest Control Adviser (PCA). To assist with pest management and decisions, the grower contracts with a PCA at an estimated cost of \$125 per acre. Pest control advisers write pest management recommendations and monitor the fields for production, nutrition, and pest problems.

Fumigation and Alternatives. In this study, arthropods, soilborne fungi/diseases, nematodes, and weeds are assumed to be controlled with a pre-plant soil fumigation. A custom operator applies chloropicrin using a flat fumigation. The custom operator provides the chloropicrin, tarp (totally impermeable film – TIF), glue, and workers to complete the practice, which includes one tractor driver. Approximately 1.5 to 2 acres can be fumigated per hour; total cost per acre is estimated at \$3,600. The grower incurs an additional cost of \$25 per acre to obtain a fumigation permit. Cost includes field measuring, field maps and fumigation layout, obtaining permission from nearby residents, and meeting with representatives from the county agricultural commissioner's office. Some growers use bed-type fumigation practices, however, this may result in increased incidence of disease and lower yields.

A key soil fumigant, methyl bromide, will no longer be used to manage pests beyond 2016. This has prompted growers to research alternative methods of soil fumigation by either using individual materials such a chloropicrin, or integrating them into a larger system of soil pest management. Several novel fumigants are currently being tested; a number of non-fumigant materials are also being used on small acreage plantings. One example of an alternative management approach is anaerobic soil disinfestation (ASD). ASD begins by adding a carbon source such as rice bran or mustard seed meal to the soil, followed by flooding the soil with water to create an anaerobic environment that is less hospitable to soil pathogens. This approach has been deployed over several hundreds of acres in California; results have been positive with several fields showing very good control of the soil pathogen *Verticillium*. However, the lack of weed control with ASD is an issue. Another method showing great promise in the control of soil pathogens and weeds is the use of steam for soil disinfestation.

Weed and Runner Removal. Fumigation provides some control of weeds in strawberry production. However, additional weed management is required during the season, and, in addition, removal of strawberry plant runners. Hand weeding and runner removal is estimated at 10.2 hours per acre per month for 10 months during the production season. Growers with different planting configurations and/or especially weedy fields may require a higher level of management and therefore higher costs.

Diseases. Powdery mildew (*Podosphaera aphanis*), Botrytis fruit rot (*Botrytis cinerea*), and Anthracnose (*Colletotrichum actatum*) are the diseases treated in this study. Treatments are combined (tank mixed) with the insect control applications. Fungicide treatments are made every 12 to 16 days through March and every 20 to 25 days thereafter ending in early September. Also, some growers may dip transplants in a fungicidal solution prior to planting as a preventative measure for disease.

Insects. Two-spotted spider mite (*Tetranychus urticae*), lygus bug (*Lygus hesperus*) and various lepidopterous larvae are the insects controlled in this study. To assist with the control of twospotted spider mite, the predatory mite *Phytoseiulus persimilis* is released four times, once in January, once in March and twice in April, for a total rate of 40,000 mites per acre per year. Application time is estimated at one hour per acre per release. Lygus bug is considered to be one of the most challenging pests to manage in strawberries. Growers control this pest using material applications, which are combined with the fungicide treatments and shown in Table A. Some growers may also use a bug vacuum twice weekly from April to October to control lygus bug. Costs are estimated at \$1,100 per acre, but are not included in this study (please see 2014 Sample Costs to Produce Organic Strawberries for more information about this practice).

Table A. Disease and Insect Material Applications-Review

MONTH	DISEASE			INSECTS		
	Botrytis	Mildew	Anthracnose	Mites	Worms	Lygus
March	Captan	Rally	Pristine	Savey		
March				<i>Persimillis</i>		
April				<i>Persimillis</i>		
April		Quadris	Quadris		Dipel	
April	Elevate	Rally			Success	
May	Captan	Thiolux		Acramite	Dipel	Rimon
May		Quadris				
June	Elevate	Rally		Acramite		Malathion
June	Captan	Thiolux				
July		Quadris				Dibrom
August		Thiolux		Danitol		Danitol
September		Thiolux				

RATES PER ACRE in study: (Not Recommendations - see label or your PCA)

Captan	4.0 lb	Dibrom	16.0 oz
Elevate	1.5 lb	Dipel	1.0 lb
Rally	5.0 oz	Malathion	2.0 pt
Thiolux	5.0 lb	Savey	6.0 oz
Quadris	12 floz	Success	5.0 floz
Acramite	1.0 lb	<i>Persimillis</i>	40,000
Danitol	16.0 oz	Pristine	23.0 oz.

Harvest. The crop is harvested from April through early October with peak harvest in June and July. Based on weight, the percent of the crop harvested each month in this study is shown in Table B. The grower hires a crew foreman to supervise one 35-person crew early and late in the season and two 35-person crews during peak production. Each person uses a push cart holding a tray with eight 1-pound clamshell containers to move down furrows and across fields. Strawberries are harvested by hand and packed into containers and trays. Other container types and sizes are used, but are not included in this study. Each worker harvests roughly three trays per hour early and late in the season when fruit load is light; during peak production each worker can harvest five to eight trays per hour. In addition to the harvest crew and foreman, field labor also includes one fruit checker and one card puncher per crew to ensure proper harvest and tray counts for each worker. A truck loader stacks harvested trays on the truck and a truck driver delivers strawberries to the cooler. The grower uses two one and one-half ton flatbed trucks

Table B. Percent Crop Harvested by Month

	April	May	June	July	Aug	Sept	Oct
Fresh %	5	12	25	26	18	12	2

holding two to three pallets at 110 trays per pallet or 330 trays per load for delivery to the cooler. Trays per pallet will vary by container type. The truck driver takes about an hour per load to deliver the filled trays. The grower will have at least one tractor, one trailer, and one toilet in the field. (Please see Labor section for additional information related to harvest costs).

Transportation and Cooling. Cost to transport strawberries from the field to the cooler is shown under harvest costs on Tables 1 and 3. Cooling costs vary by cooler and grower volume and are estimated at \$0.50 per tray in this study.

Assessments. Growers and shippers pay the California Strawberry Commission (CSC) an assessment per tray (eight 1-pound containers) for research and marketing activities. The current assessment is \$0.045 per tray, which is split equally between grower and shipper. Grower cost is therefore estimated at \$0.0225 per tray.

Yields. Strawberry yield is measured in trays per acre. Average yield for fresh market fruit ranges from 4,000 to 10,000 trays per acre and can be even higher for some varieties. This study assumes a yield of 7,000 trays containing eight 1-pound clamshells per acre. The weight ranges from 9.5 to 10.0 pounds per tray to account for some variance in fruit weight per tray and including the weight of the clamshells and trays.

Returns. Based on 2012 to 2016 USDA Watsonville-Salinas Shipping Point returns (FOB), the representative return is \$10.00 per tray. Strawberry prices range from \$7.00 to \$14.00 in the area. Estimated net returns to growers are shown in Table 4. Higher prices are seen early and late in the season when the volume of harvested product is low; lower prices are seen when peak season volumes are high.

Sales/Marketing. Selling costs for fresh market fruit are estimated at eight percent of the selling price or \$0.80 per tray (\$10.00 x 8%), which is shown on Tables 1 to 3.

Post-Harvest Cleanup. After all harvest operations have been completed, strawberry plants are mowed, the plastic mulch and drip tape are removed and disposed of at a landfill or recycling center. In this study a custom operator performs this service; it may also be handled by growers using their own equipment and labor. Growers may also have a crew walk the field to make sure all mulch has been removed from the field. The field is disked twice in preparation for the next crop. The discing operation is incorporated into the land preparation costs.

Growing Cost. Some growers along the Central Coast of California prefer to focus on growing costs and therefore separate total harvest costs from total cash costs, equipment depreciation and replacement costs. For this study, growing costs are noted at the bottom of Table 1, and are calculated by subtracting total harvest costs from total costs. Growing costs depend upon many variables including location and grower.

Labor, Equipment, and Interest

Labor. Labor rates are estimated at \$21.70 per hour for machine operators and \$16.10 for field labor, which includes overhead of 40 percent. The basic hourly wages are \$15.50 for machine operators and \$11.50 for field labor. Harvest crews are often paid a base wage plus piecework rate, or straight piecework depending on the time of harvest. In this study, harvest wages are calculated using the field labor rate. The overhead

includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for strawberry crops (code 0079), and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2016. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

In 2016 new minimum wage and overtime laws were passed in California. It is not yet clear what the overall impact of the laws will be on prevailing agricultural wages, therefore agricultural labor costs are currently in flux and may differ substantially from those shown in this study. With respect to minimum wage, growers may already pay wages that are higher than the state's legal requirement. Tables C and D show the phase-in schedules for the minimum wage and overtime laws.

Table C. Minimum Wage Phase-In Schedule, 2016 to 2022[†]

Year	California Minimum Wage	Minimum Wage Increase (%)
2016	10.00	na
2017	10.50	5.0
2018	11.00	4.8
2019	12.00	9.0
2020	13.00	8.3
2021	14.00	7.7
2022	15.00	7.1

[†] For employers with 26 or more employees.

Table D. Overtime Phase-In Schedule, 2016 to 2022[†]

Year	California Overtime Phase-In Hours Per Week	Overtime Hours/Week [‡]
2016	60	na
2017	60	na
2018	60	na
2019	55	5
2020	50	10
2021	45	15
2022	40	20

[†] For employers with 26 or more employees.

[‡] Assuming a 60-hour work week and no other adjustments.

The new overtime law will gradually decrease the number of hours employees can work on a daily and weekly basis before overtime wages are required. Prior to its passage field workers and equipment operators could work up to 10 hours per day or 60 hours per week without overtime wages; by 2022 the requirement will be lowered to 8 hours per day or 40 hours per week for employers with 26 or more employees. The new overtime law may change wages and scheduling of work in complicated ways as it is phased in.

Growers may also choose to use a farm labor contractor or the H-2A guestworker visa program to employ workers. When using either one of these two approaches, base rates, overhead and compliance with housing, meals, transportation, and other requirements will vary. Use of these services may result in labor costs that are higher than those shown in this study but may be necessary in order to assure a reliable supply of labor.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 4.25 percent per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post-harvest operations is discounted back to the last harvest month using a negative interest charge. The rate will vary depending upon various factors, but the rate used in this study is considered a typical lending rate by a farm lending agency as of January 2016.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural and Biological Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$2.70 (excludes excise taxes) and \$3.25 per gallon, respectively. The cost includes a 2 percent local sales tax on diesel fuel, and 8 percent sales tax on gasoline. Gasoline costs also include federal and state taxes, which are refundable for on-farm use when filing income taxes. The fuel, lube, and repair cost per acre for each operation in Table 1 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel and down time.

Risk. The risks associated with producing and marketing fresh market strawberries are considered high. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, production, market, legal and human resource risks that ultimately affect the profitability and economic viability of fresh market strawberries. In this area invasive pests pose particular regulatory and management challenges and increase production and marketing risks for growers. In addition, labor availability, scheduling and cost is a noteworthy human resource risk. In recent years labor constraints have meant challenges in securing and retaining a sufficient number of workers to ensure timely and effective farm operations. Some growers report paying higher wages to attract and retain workers; others may pay overtime because of labor constraints. Overall profitability of the crop is negatively impacted in either case.

Cash Overhead

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. Because overhead costs are farm and ranch specific, costs will vary among growers.

Property Taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1 percent of the average value of the property. Average value equals new cost plus salvage value divided by two on a per acre basis.

Insurance. Insurance for farm investments varies depending upon the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.843 percent of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and other potential farm related liabilities and costs \$1,914.

Office Expenses. Annual office and business expenses are estimated at \$750 per acre. Costs include, but are not limited to, a variety of administration and office expenses such as office supplies, telephones, bookkeeping, accounting, road maintenance, utilities, and miscellaneous expenses.

Food Safety and Regulatory Programs. To ensure the safety of fresh products, accommodate buyer requests, and comply with regulatory programs (i.e. for water and air quality), growers incorporate various

programs into their operations. Part of a food safety program is participation in third party (independent) audits. Costs associated with a food safety program varies depending upon the farm and inspection circumstances and employee training requirements and is estimated at \$100 per acre per year. In addition, a cost of \$80 per acre per year is included for management and compliance with regulatory programs.

Land Rent. Land rents in Monterey and Santa Cruz Counties range from \$750 to \$3,000 per acre per year. In this study land rent is assumed to be \$2,700 per acre per year or \$3,000 per producing acre per year. Land rent includes developed well(s) and irrigation system. In general, growers are responsible for the portion above ground such as the pump, and the landowner is responsible for what is below ground, such as the well running dry (please also see the Irrigation System section for more information).

Field Sanitation. Sanitation services provide portable toilets with washing stations, delivery and service, and is estimated at \$6,340 annually. Separate potable water and single-use drinking cups are also supplied. Sanitation facilities vary depending on the size of the labor force.

Farm Supervisor. The grower hires a farm supervisor to oversee some of the cultural and harvest operations as well as fill in on some of the operations where temporary assistance is needed. The estimated cost for the supervisor is \$1,000 per acre. Larger operations may have multiple supervisory levels; associated costs will therefore differ.

Non-Cash Overhead

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$.

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural and Biological Engineers (ASABE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value and purchase price for land are the same because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 5.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

Interest Rate. The interest rate of 3.75% used to calculate capital recovery cost is the effective long term

interest rate effective January 1, 2016. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Building and Tools. Estimated costs for both a metal building and shop and hand tools are included in the study.

Fuel Tanks. Two fuel tanks, one for diesel and one for gasoline, are located on the property. The tanks are set up in a cement containment pad that meets federal, state, and county regulations.

Irrigation System. The irrigation system is maintained by the landowner and assumed to be included in the land rental cost; in some cases the grower may be responsible for maintenance. The grower invests in and owns sprinkler pipe and drip system materials sufficient for irrigation needs. The grower also owns a trailer and other equipment needed for moving pipe and other irrigation supplies to and from the field. Irrigation water is pumped from a well and delivered to the field through an underground pipe system. Main lines above ground are connected to the underground system to deliver water for the sprinkler and drip irrigations. In this study water is pumped from a depth of 120 feet in a 300-foot well and the grower pays the pumping costs.

Equipment. Farm equipment is purchased when it is both new or used. This study shows the current purchase price for new equipment, which is adjusted to 60 percent to reflect a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 5. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

Table Values. Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. COSTS PER ACRE to PRODUCE AND HARVEST STRAWBERRIES
 CENTRAL COAST REGION – 2016

Operation	Operation	Cash and Labor Costs Per Acre						Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent			
Cultural:									
Soil Samples (2 per 45 acre)	0.00	0	0	0	0	6	6		
Disc 8X	1.03	27	37	20	0	0	83		
Subsoil 2X	1.50	39	53	27	0	0	119		
Chisel 2X	0.60	16	21	10	0	0	47		
Sprinkle Irrigation - Pre-Plant	1.30	55	8	3	23	0	88		
Fumigate - Flat - TIF Tarped	0.00	0	0	0	0	3,600	3,600		
Fumigation Permit	0.00	0	0	0	0	25	25		
Tarp Retrieval/Disposal	0.00	0	0	0	0	100	100		
List/Shape 48" beds	0.25	7	9	4	0	0	19		
Fertilize Pre-Plant	0.29	8	2	1	425	0	435		
Install Drip Tape/System	2.10	95	13	6	1,525	0	1,638		
Grade Field Roads 2X	0.58	15	4	1	0	0	20		
Lay Mulch	2.00	181	12	9	452	0	654		
Punch Holes	1.50	39	9	4	0	0	52		
Plant (Includes Replant Labor & Plants)	50.00	805	0	0	3,202	0	4,007		
Roll Plants to Pack	0.20	5	1	0	0	0	7		
Sprinkle Irrigation - Post-Plant	1.75	78	11	3	56	0	148		
Hand Weed/Runner Removal	102.00	1,642	0	0	0	0	1,642		
Botrytis/Mildew/Mite/Anthracnose	0.58	15	5	2	273	0	295		
Predatory Mites - Persimilis 4X	4.00	64	0	0	260	0	324		
Drip Irrigation - Season	10.50	169	0	0	540	0	709		
Fertigate- CAN 17	0.00	0	0	0	263	0	263		
Botrytis/Midew/Anthracnose	0.58	15	5	2	149	0	171		
Mildew/Anthracnose/Worms	0.58	15	5	2	48	0	71		
Botrytis/Mildew/Worms	1.17	30	9	5	150	0	195		
Botrytis/Mildew/Mites/Worms/Lyigus	1.17	30	9	5	209	0	254		
Botrytis/Mildew/Mite/Lyigus	1.17	30	9	5	253	0	297		
Mildew/Lyigus	0.58	15	5	2	48	0	71		
Mildew/Mites/Lyigus	0.58	15	5	2	35	0	57		
Mildew	0.58	15	5	2	6	0	28		
Year End Cleanup	0.00	0	0	0	0	500	500		
PCA	0.00	0	0	0	0	125	125		
Pickup Truck Use	1.71	82	14	6	0	0	101		
TOTAL CULTURAL COSTS	188.32	3,507	251	121	7,917	4,356	16,151		
Harvest:									
Harvest Strawberries	0.00	20,174	0	0	11,760	2,590	34,524		
Load/Haul	7.71	851	115	61	0	0	1,027		
Cool	0.00	0	0	0	0	3,500	3,500		
Market/Sales Fee	0.00	0	0	0	0	5,600	5,600		
Assessments - CSC	0.00	0	0	0	158	0	158		
TOTAL HARVEST COSTS	7.71	21,025	115	61	11,918	11,690	44,809		
Interest on Operating Capital at 4.25%							1,296		
TOTAL OPERATING COSTS/ACRE	196	24,532	366	182	19,835	16,046	62,256		

* A discussion about new labor laws and costs are included on pages 6 and 7 of this study; labor costs may vary substantially from those shown in here.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. CONTINUED
 CENTRAL COAST REGION - 2016

Operation	Operation		Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent			
CASH OVERHEAD:									
Food Safety								100	
Land Rent								2,700	
Liability Insurance								38	
Office Expense								750	
Ranch Supervisor								1,000	
Field Sanitation								127	
Regulatory Programs								80	
Property Taxes								38	
Property Insurance								3	
Investment Repairs								65	
TOTAL CASH OVERHEAD COSTS/ACRE								4,901	
TOTAL CASH COSTS/ACRE								67,157	
NON-CASH OVERHEAD:									
		<u>Per Producing Acre</u>		<u>Annual Cost</u>					
				<u>Capital Recovery</u>					
Buildings		983		55				55	
Fuel Tanks		220		15				15	
Shop/Hand Tools		345		29				29	
Harvest Carts		23		5				5	
Irrigation System		222		50				50	
Sprinkler Pipe		1,465		80				80	
Equipment		3,123		283				283	
TOTAL NON-CASH OVERHEAD COSTS		6,381		517				517	
TOTAL COSTS/ACRE								67,674	

TOTAL COST PER ACRE – HARVEST COST PER ACRE = GROWING COST PER ACRE $\$67,674 - \$44,809 = \$22,865$

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. COSTS and RETURNS PER ACRE to PRODUCE AND HARVEST STRAWBERRIES
 CENTRAL COAST REGION - 2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Strawberry	7,000	tray	10.00	70,000	
TOTAL GROSS RETURNS	7,000	tray		70,000	
OPERATING COSTS					
Insecticide:				475	
Savey 50 DF	6.00	oz	20.69	124	
Dipel DF	2.00	lb	15.65	31	
Success	5.00	floz	7.97	40	
Acramite 50WS	2.00	lb	93.14	186	
Rimon 0.83 EC	11.00	floz	3.07	34	
Malathion 8	2.00	pint	7.76	16	
Dibrom 8 Emulsive	16.00	floz	0.98	16	
Danitol 2.4 EC	16.00	floz	1.80	29	
Fungicide:				696	
Captan 50W	16.00	lb	6.92	111	
Rally 40W	20.00	oz	5.50	110	
Pristine	46.00	oz	4.08	188	
Quadris	36.00	floz	2.72	98	
Elevate 50WDG	3.00	lb	55.31	166	
Thiolux	20.00	lb	1.20	24	
Miticide:				260	
Persimilis (Mite)	40.00	thou	6.50	260	
Fertilizer:				688	
Scotts 18-8-13	500.00	lb	0.85	425	
CAN 17 17-0-0 (N)	350.00	lb N	0.75	263	
Custom:				6,821	
Soil Analysis	0.04	each	150.00	6	
Fumigate - TIF Tarped	1.00	Acre	3600.00	3,600	
Fumigation Permit	1.00	acre	25.00	25	
Mulch Retrieval/Disposal	1.00	acre	100.00	100	
Misc Picking Costs	7,000.00	tray	0.37	2,590	
Year End Cleanup	1.00	acre	500.00	500	
Materials:				13,737	
T-Tape	21,780.00	foot	0.07	1,525	
Mulch Pins	4,000.00	each	0.02	60	
Mulch 48" 1.25mil	10,890.00	foot	0.04	392	
Trays/Clamshells	7,000.00	each	1.68	11,760	
Water:				619	
Irrigation Water	27.50	acin	22.50	619	
Plants:				3,202	
Strawberry Plants	22,869.00	each	0.14	3,202	
Contract:				9,225	
Cooler	7,000.00	tray	0.50	3,500	
Market/Sales Fee	7,000.00	tray	0.80	5,600	
PCA	1.00	acre	125.00	125	
Assessment:				158	
Strawberry Commission	7,000.00	tray	0.02	158	
Labor				24,533	
Equipment Operator Labor	46.42	hrs	21.70	1007	
Non-Machine Labor	14,61.23	hrs	16.10	23,526	
Machinery				549	
Fuel-Gas	39.61	gal	3.25	129	
Fuel-Diesel	87.15	gal	2.70	235	
Lube				55	
Machinery Repair				130	
Interest on Operating Capital @ 4.25%				1,296	
TOTAL OPERATING COSTS/ACRE				62,256	
TOTAL OPERATING COSTS/TRAY				9	
NET RETURNS ABOVE OPERATING COSTS				7,744	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. CONTINUED
 CENTRAL COAST REGION - 2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Food Safety				100	
Land Rent				2,700	
Liability Insurance				38	
Office Expense				750	
Ranch Supervisor				1,000	
Field Sanitation				127	
Regulatory Programs				80	
Property Taxes				38	
Property Insurance				3	
Investment Repairs				65	
TOTAL CASH OVERHEAD COSTS/ACRE				4,901	
TOTAL CASH OVERHEAD COSTS/TRAY				1	
TOTAL CASH COSTS/ACRE				67,157	
TOTAL CASH COSTS/TRAY				10	
NET RETURNS ABOVE CASH COSTS				2,843	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Buildings				55	
Fuel Tanks				15	
Shop/Hand Tools				29	
Harvest Carts				5	
Lateral Lines				50	
Sprinkler Pipe				80	
Equipment				283	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				517	
TOTAL NON-CASH OVERHEAD COSTS/TRAY				0	
TOTAL COST/ACRE				67,674	
TOTAL COST/TRAY				10	
NET RETURNS ABOVE TOTAL COST				2,326	

* A discussion about new labor laws and costs are included on pages 6 and 7 of this study; labor costs may vary substantially from those shown in here.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. MONTHLY CASH COSTS PER ACRE to PRODUCE AND HARVEST STRAWBERRIES
 CENTRAL COAST REGION – 2016

	AUG 15	SEP 15	OCT 15	NOV 15	DEC 15	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16	AUG 16	SEP 16	OCT 16	Total
Cultural:																
Soil Samples (2 per 45 acre)	6															6
Disc 8X	83															83
Subsoil 2X		119														119
Chisel 2X		47														47
Sprinkle Irrigation - Pre-Plant		88														88
Fumigate - Flat - TIF Tarped		3,600														3,600
Fumigation Permit		25														25
Tarp Retrieval/Disposal		100														100
List/Shape 48" beds		19														19
Fertilize Pre-Plant		435														435
Install Drip Tape/System		1,638														1,638
Grade Field Roads 2X		10														20
Lay Mulch		654							10							654
Punch Holes			52													52
Plant (Includes Replant Labor & Plants)			4,007													4,007
Roll Plants to Pack			7													7
Sprinkle Irrigation - Post-Plant			148													148
Hand Weed/Runner Removal					164	164	164	164	164	164	164	164	164	164	164	1,642
Botrytis/Mildew/Mite/Anthracnos								295								295
Predatory Mites - Persimilis 4X						81		81	162							324
Drip Irrigation - Season								92	103	103	103	103	103	103	103	709
Fertigate- CAN 17								38	38	38	38	38	38	38	38	263
Botrytis/Mildew/Anthracnose								171								171
Mildew/Anthracnose/Worms									71							71
Botrytis/Mildew/Worms									195							195
Botrytis/Mildew/Mites/Worms/Lygus										254						254
Botrytis/Mildew/Mite/Lygus											297					297
Mildew/Lygus												71				71
Mildew/Mites/Lygus													57			57
Mildew														28		28
Year End Cleanup															500	500
PCA															125	125
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	101
TOTAL CULTURAL COSTS	96	6,743	4,221	7	171	252	171	858	739	565	609	382	369	340	632	16,151
Harvest:																
Harvest Strawberries									2,709	4,577	7,833	7,600	6,152	4,577	1,076	34,524
Load/Haul									70	129	234	231	179	129	53	1,027
Cool									175	420	875	910	630	420	70	3,500
Market/Sales Fee									280	672	1,400	1,456	1,008	672	112	5,600
Assessments - CSC															158	158
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	3,234	5,799	10,342	10,198	7,969	5,799	1,469	44,809
Interest on Operating Capital @4.25%	0	24	39	39	40	40	41	44	58	81	120	157	187	208	216	1,296
TOTAL OPERATING COSTS/ACRE	96	6,767	4,260	46	211	293	212	902	4,031	6,444	11,070	10,737	8,524	6,347	2,316	62,256

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. CONTINUED
 CENTRAL COAST REGION – 2016

	AUG 15	SEP 15	OCT 15	NOV 15	DEC 15	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16	AUG 16	SEP 16	OCT 16	Total
CASH OVERHEAD																
Food Safety													100			100
Land Rent	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	2,700
Liability Insurance													38			38
Office Expense	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	750
Ranch Supervisor	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	1,000
Field Sanitation	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	127
Regulatory Programs													80			80
Property Taxes							19						19			38
Property Insurance							2						2			3
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	65
TOTAL CASH OVERHEAD COSTS	339	339	339	339	339	339	359	339	339	339	339	359	557	339	339	4,901
TOTAL CASH COSTS/ACRE	435	7,106	4,598	385	549	631	571	1,241	4,370	6,783	11,409	11,096	9,081	6,685	2,655	67,157

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

Table 4. RANGING ANALYSIS - STRAWBERRIES

CENTRAL COAST REGION - 2016

COSTS PER ACRE AND PER TRAY AT VARYING YIELDS TO PRODUCE AND HARVEST STRAWBERRIES

	YIELD (TRAY/ACRE)						
	4,000	5,000	6,000	7,000	8,000	9,000	10,000
OPERATING COSTS/ACRE:							
Cultural	16,151	16,151	16,151	16,151	16,151	16,151	16,151
Harvest	25,767	32,114	38,461	44,809	51,155	57,502	63,850
Interest on Operating Capital @ 4.25%	1,015	1,108	1,202	1,296	1,390	1,483	1,577
TOTAL OPERATING COSTS/ACRE	42,934	49,376	55,816	62,256	68,698	75,139	81,580
TOTAL OPERATING COSTS/TRAY	10.73	9.88	9.30	8.89	8.59	8.35	8.16
CASH OVERHEAD COSTS/ACRE	4,901	4,901	4,901	4,901	4,901	4,901	4,901
TOTAL CASH COSTS/ACRE	47,835	54,277	60,717	67,157	73,599	80,040	86,481
TOTAL CASH COSTS/TRAY	11.96	10.86	10.12	9.59	9.20	8.89	8.65
NON-CASH OVERHEAD COSTS/ACRE	517	517	517	517	517	517	517
TOTAL COSTS/ACRE	48,353	54,794	61,235	67,674	74,116	80,557	86,998
TOTAL COSTS/TRAY	12.00	11.00	10.00	10.00	9.00	9.00	9.00

Net Return per Acre above Operating Costs for Strawberry

PRICE (\$/tray)	YIELD (tray/acre)						
Strawberry	4,000	5,000	6,000	7,000	8,000	9,000	10,000
7.00	-14,934	-14,376	-13,816	-13,257	-12,698	-12,139	-11,580
8.00	-10,934	-9,376	-7,816	-6,257	-4,698	-3,139	-1,580
9.00	-6,934	-4,376	-1,816	743	3,302	5,861	8,420
10.00	-2,934	624	4,184	7,744	11,302	14,861	18,420
11.00	1,066	5,624	10,184	14,743	19,302	23,861	28,420
12.00	5,066	10,624	16,184	21,743	27,302	32,861	38,420
14.00	13,066	20,624	28,184	35,743	43,302	50,861	58,420

Net Return per Acre above Cash Costs for Strawberry

PRICE (\$/tray)	YIELD (tray/acre)						
Strawberry	4,000	5,000	6,000	7,000	8,000	9,000	10,000
7.00	-19,835	-19,277	-18,717	-18,158	-17,599	-17,040	-16,481
8.00	-15,835	-14,277	-12,717	-11,158	-9,599	-8,040	-6,481
9.00	-11,835	-9,277	-6,717	-4,158	-1,599	960	3,519
10.00	-7,835	-4,277	-717	2,843	6,401	9,960	13,519
11.00	-3,835	723	5,283	9,842	14,401	18,960	23,519
12.00	165	5,723	11,283	16,842	22,401	27,960	33,519
14.00	8,165	15,723	23,283	30,842	38,401	45,960	53,519

Net Return per Acre above Total Costs for Strawberry

PRICE (\$/tray)	YIELD (tray/acre)						
Strawberry	4,000	5,000	6,000	7,000	8,000	9,000	10,000
7.00	-20,353	-19,794	-19,235	-18,675	-18,116	-17,557	-16,998
8.00	-16,353	-14,794	-13,235	-11,675	-10,116	-8,557	-6,998
9.00	-12,353	-9,794	-7,235	-4,675	-2,116	443	3,002
10.00	-8,353	-4,794	-1,235	2,326	5,884	9,443	13,002
11.00	-4,353	206	4,765	9,325	13,884	18,443	23,002
12.00	-353	5,206	10,765	16,325	21,884	27,443	33,002
14.00	7,647	15,206	22,765	30,325	37,884	45,443	53,002

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, and BUSINESS OVERHEAD COSTS FOR STRAWBERRIES
CENTRAL COAST REGION - 2016

ANNUAL EQUIPMENT COSTS								
Yr.	Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
16	205HP Crawler	350,000	15	68,139	27,465	176	2,091	29,732
16	42HP 4WD Tractor	35,400	15	6,892	2,778	18	211	3,007
16	Rear Blade 3 pt 6'	1,012	15	97	84	0	6	91
16	Chisel Spring 14'	9,800	15	941	818	5	54	876
16	Disc Offset 14'	21,800	10	3,855	2,330	11	128	2,469
16	Drip Machine 52"	3,500	15	336	292	2	19	313
16	Fert. Drill 52"	5,000	10	884	534	2	29	566
16	Mulch Layer 52"	22,500	15	2,160	1,879	10	123	2,012
16	Lister/Shaper 52"	5,000	15	480	417	2	27	447
16	Punch Machine 48"	5,000	15	480	417	2	27	447
16	Ripper 5 Shank 14'	10,800	10	1,910	1,154	5	64	1,223
16	Roller 8'	4,500	15	432	376	2	25	402
16	Sprayer 20' boom	3,630	4	1,336	678	2	25	705
16	Trailer-Pipe	2,150	20	120	151	1	11	163
16	55HP 2WD Tractor	40,225	15	7,831	3,157	20	240	3,417
16	Truck 1.5 Ton	58,000	10	17,132	5,619	32	376	6,026
16	Truck 1.5 Ton	58,000	10	17,132	5,619	32	376	6,026
16	Pickup Truck 1/2 Ton	28,000	7	10,621	3,267	16	193	3,476
TOTAL		664,317	-	140,779	57,035	339	4,025	61,399
60% of New Cost*		398,590	-	84,467	34,221	204	2,415	36,840

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
INVESTMENT								
Buildings	49,162	30	0	2,757	21	246	983	4,007
Fuel Tanks	10,975	20	768	763	5	59	220	1,047
Shop/Hand Tools	17,232	15	1,345	1,455	8	93	345	1,900
Harvest Carts	1,042	5	0	232	0	5	21	259
Irrigation System	10,000	5	0	2,231	4	50	200	2,485
Sprinkler Pipe	65,934	20	32,967	3,609	42	495	1,319	5,464
TOTAL INVESTMENT	154,345	-	35,080	11,047	80	947	3,088	15,162

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Food Safety	50	acre	100	5,000
Regulatory Programs	50	acre	80	4,000
Land Rent	50	acre	2,700	135,000
Liability Insurance	50	acre	38	1,914
Office Expense	50	acre	750	37,500
Ranch Supervisor	50	acre	1,000	50,000
Field Sanitation	50	acre	127	6,340

UC COOPERATIVE EXTENSION
Table 6. HOURLY EQUIPMENT COSTS FOR STRAWBERRIES
 CENTRAL COAST REGION - 2016

Yr	Description	Strawberry	Total	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used		Insurance	Taxes	Lube & Repairs	Fuel		
16	205HP Crawler	167	1066	15.46	0.10	1.18	13.97	32.12	46.10	62.83
16	42HP 4WD Tractor	482	1066	1.56	0.01	0.12	1.76	5.57	7.33	9.02
16	Blade Rear 3 pt 6'	31	100	0.51	0.00	0.03	0.13	0.00	0.13	0.68
16	Chisel Spring 14'	27	133	3.69	0.02	0.24	2.07	0.00	2.07	6.02
16	Disc Offset 14'	47	200	6.99	0.03	0.38	3.64	0.00	3.64	11.05
16	Drip Machine 52"	90	100	1.75	0.01	0.12	0.95	0.00	0.95	2.83
16	Fert. Drill 52"	13	150	2.14	0.01	0.12	1.40	0.00	1.40	3.67
16	Mulch Layer	90	133	8.47	0.05	0.56	2.56	0.00	2.56	11.64
16	Lister/Shaper 52"	11	133	1.88	0.01	0.12	1.02	0.00	1.02	3.04
16	Punch Machine 48"	68	133	1.88	0.01	0.12	0.57	0.00	0.57	2.59
16	Ripper 5 Shank 14'	68	200	3.46	0.02	0.19	2.49	0.00	2.49	6.16
16	Roller 8'	9	133	1.69	0.01	0.11	0.51	0.00	0.51	2.33
16	Sprayer 20' boom	315	375	1.09	0.00	0.04	1.00	0.00	1.00	2.13
16	Trailer - Pipe	137	200	0.45	0.00	0.03	0.04	0.00	0.04	0.53
16	55HP 2WD Tractor	347	800	2.37	0.02	0.18	2.94	7.29	10.23	12.79
16	Truck 1.5 Ton	173	200	16.86	0.10	1.13	7.89	14.90	22.78	40.86
16	Truck 1.5 Ton	173	200	16.86	0.10	1.13	7.89	14.90	22.78	40.86
16	Pickup Truck 1/2 Ton	77	285	6.88	0.03	0.41	3.30	8.13	11.42	18.74