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

2019

SAMPLE COSTS TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

FRESH MARKET

CENTRAL COAST REGION

Santa Cruz, Monterey and San Benito Counties

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Central Coast Region - Santa Cruz, Monterey, and San Benito Counties 2019

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Acknowledgements. Thanks is extended to the growers, suppliers, and consultants that provided information and expertise in the development of this study.

INTRODUCTION

Organic production, as defined by the USDA's Organic Foods Production Act of 1990, is a "production system that is managed in accordance with the Act and regulations in this part to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity."

Sample costs to produce and harvest organic strawberries in Santa Cruz, Monterey, and San Benito Counties are presented in this study. It 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 and harvest 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 titled "Your Cost" is provided to enter your actual costs on Tables 1 and 2.

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

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

ASSUMPTIONS

The following assumptions refer to calculations in Tables 1 to 6 beginning on page 11 and pertain to sample costs to produce and harvest organic strawberries in the Central Coast Region - Santa Cruz, Monterey, and San Benito Counties. Practices described represent methods considered typical for organic strawberry production in the region. The costs, practices, and materials will not be applicable to all situations in every production year. Cultural practices, materials, and organic strawberry production and harvest costs vary by grower and region, and differences can be significant. The practices and inputs used in the cost study serve as a guide only. Organic growers should be certain that any material inputs and applications meet the regulatory requirements of state and national programs, and their certifying agent(s). **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.**

Conventional strawberries represent approximately 87 percent of total strawberry acreage along the Central Coast, according to 2019 California Strawberry Commission survey data. Many of the practices that are used in organic production are also used in conventional production. Differences between the two production systems are found primarily, though not exclusively, in crop fertilization and pest management.

Farm. This study assumes a farm operation size of 30 contiguous acres of rented land. Organic strawberries are planted on 27 acres; roads, the irrigation system, and on-farm buildings account for the remaining three acres. In this area, arrangements are often made with other farmers and owners of organically certified land to rotate strawberries with vegetable and other berry crops. The grower rents the land, which includes a small shop, for $3,000 per acre, per year, and owns the machinery and equipment used. Farming on sloped or hilly land may result in varying costs for land rent and cultural practices.

Production Cultural Practices and Material Inputs

To gain certified organic status, growers must farm on land to which no synthetically formulated fertilizers and/or pesticides have been applied for a minimum of three years. Organic farmers generally use a "systems management" approach to farming by including a suite of production practices such as crop rotation, diversification, cover crops and organic matter additions to help build soil fertility and manage pests. Organic strawberries are rotated with other crops to assist with disease and weed control and for long-term improvements to soil fertility.

Land Preparation, Pre-Plant Fertilization, and Irrigation. This study assumes that a soil building cover crop is planted prior to a strawberry – vegetable two-crop rotation. Costs associated with the cover crop are therefore split between the two crops, with half the cost shown here. The cover crop is disked twice in September to incorporate plant residue. Two soil samples are then taken to help determine fertilization practices for the 27 acre planting. The field is then subsoiled five times, disked once, leveled, and chiseled twice. The field is then sprinkler irrigated with two acre-inches of water to assist with soil preparation and weed management. Compost is applied at the rate of five tons per acre by a custom operator several days later and then sprinkler irrigated again with 0.5 acre-inches of water to assist with the incorporation of the compost. In October, the field is chiseled once and beds are listed. At the time of listing a fertilizer mixture is applied, consisting of True Organics preplant fertilizer (500 lbs 10-5-2 and 500 lbs 12-3-0), along with the soil amendment gypsum, which is applied at the rate of 2 tons per acre. Beds (48-inches wide) are then shaped. Drip irrigation tape at two lines per bed is installed immediately after, and the beds are covered with black 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 to prepare for transplanting. Strawberry plants are delivered to the field edge and then transplanted into two rows, 12 inches apart, for a per acre plant density of 21,780. Planting takes approximately 50 hours per acre. Several strawberry varieties such as Albion, Chandler, Monterey, San Andreas, and Sweet Anne, and a number of proprietary varieties are suitable for organic production in the region, but no specific variety is assumed in this study. Fields are sprinkler irrigated with roughly one acre-inch of water immediately after planting. In this study, seven percent of the field, or 1,525 plants per acre, is replanted in the weeks and months that follow because of poor establishment, gopher damage, and other possible field conditions.

Post-Plant Fertilization. From February to September (eight months), the grower applies a series of foliar sprays, including Biomin Calcium (2-0-0-7, a calcium supplement) and Maxi Crop Seaweed Extract, once per month at a rate of one gallon per acre and 2.5 pounds per acre, per application, respectively. These materials are used to ensure that a balance of N, P, K and micronutrients are supplied to the plants.

From March to September, liquid fertilizers are applied to the soil through the drip irrigation system. Agrothrive LF, a fish emulsion, is applied every other week at the rate of 15 gallons per acre per application for a total of 16 applications. Fertilization materials and rates will vary by grower and year depending soil tests and plant needs.

Post-Plant Irrigation. From March through September (seven months), strawberries are drip irrigated two to three times per week using a total of 24 acre-inches of water over the entire growing season. Including the 3.5 acre inches applied by sprinkler irrigation earlier in the season, a total of 27.5 acre inches is applied to the field. Effective rainfall is not taken into account. The amount of water needed to produce the crop can differ substantially in the area and depends upon factors such as weather, soil type, well depth, and field conditions. The cost of pumping water is estimated at $270 per acre-foot or $22.50 per acre-inch. Water costs can also vary considerably in the area depending upon the water district or agency, delivery, associated fees, and pumping variables.

Pest Management. The pesticides and rates mentioned in this cost study are listed in the *UC Integrated Pest Management Guidelines, Strawberries*. For more information on pesticides, pest identification, monitoring, and management visit the UC IPM website at http://ipm.ucdavis.edu, or contact your local UCCE farm advisor. Pesticide use permits and regulatory information are available through the local county 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. The pesticide program in this report is considered typical, but organic practices vary considerably within the region; the effectiveness of practices depends upon field and environmental conditions.

Pest Control Adviser (PCA). To assist with pest management decisions in this study, the grower contracts with a PCA at an estimated cost of $150 per acre per year. Pest Control Advisers write pest management recommendations and monitor the fields for production, nutrition, and pest problems.

Weeds. Weed management is especially challenging for organic strawberry production because soil fumigation and most herbicides are not allowed under organic regulations. For 10 months beginning in December and ending in September, weeds in and around plants are managed by hand. Although weeding times can vary substantially from grower to grower because of field history, weed populations, and the color of plastic selected, this study assumes an average of 22 hours of hand weeding per acre per month. Weeds in furrows between beds are controlled by using mechanical cultivations three times during the growing season.

Vertebrates. Rodents, such as pocket gophers (*Thomomys spp*.), cause damage in strawberry fields by feeding on the plant roots, digging tunnels into the beds and also gnawing holes in the drip irrigation tape. They may be controlled in organic strawberry fields by trapping and other means throughout the growing season. Labor cost is estimated at four hours per acre for the season.

Insects and mites. Pests common to strawberries in this area include lygus bug *(Lygus hesperus),* leafrollers including the regulated light brown apple moth *(LBAM [Epiphyas postvittana]),* twospotted spider mite *(Tetranychus urticae),* Western flower thrips *(Frankliniella occidentalis),* vinegar flies *(Drosophila* spp.*)* certain species of aphids and other Lepidopterous pest including fall armyworms.

Lygus bug is considered to be one of the most challenging pests to manage in strawberry production. To assist with management of lygus bugs, current grower practice is use of a bug vacuum twice per week beginning in April and ending in October (or end of the season).

To assist with the control of two-spotted spider mite, the predatory mite (*Phytoseiulis persimilis*), is released four times, twice in February and twice in March, for a total application rate of 80,000 mites per acre, per year. Application time is estimated at one hour per acre, per release. Lepidopterous pests (worms) are managed using four applications of Dipel (*Bacillus thuringiensis* [Bt]), applied at a rate of one pound per acre, per application in May and June. Leafrollers including the light brown apple moth are managed using three applications of Entrust SC, one each in June, August and September, at the rate of 6.0 ounces per acre. The Entrust applications also assist with management of vinegar flies, as does the culling of fruit mentioned below.

Diseases. Powdery mildew (*Podosphaera aphanis*) and Botrytis fruit rot (*Botrytis cinerea*) are the two foliar and fruit diseases most common to strawberries in this area. Micronized sulfur (Kumulus) is applied for powdery mildew control at the rate of five pounds per acre, per application, every three weeks, beginning in late March and ending in early October, totaling nine applications per year. Because no organically acceptable fungicide has proven consistently effective for Botrytis fruit rot, the associated disease pressure is minimized by culling diseased fruit by hand during harvest. It is assumed to be included in harvest costs.

Harvest. The crop is harvested twice per week from April through early October with peak harvest in June, July, and August. The percent of the total crop harvested each month is shown in Table A. Organic strawberries are harvested by hand at an average seasonal piece rate cost of $5.75 per tray. Crew size and number of crews will vary through the season depending upon the yield and labor availability. Harvest rate per person ranges from three trays per hour early and late in the season to five to eight trays per hour during peak harvest. Fruit is harvested into a tray on a picking cart that contains eight one-pound-sized clamshells. Other container types and sizes are used but are not included in this study. During harvest practices Botrytis infected or bronzed, overripe, and misshapen fruit is culled and discarded in the furrows. Additional field labor includes one person to check for proper harvest practices and one card puncher per crew to count the trays harvested by each picker. To load and haul the fruit, one truck loader stacks the trays on the vehicle and the driver delivers the strawberries to the cooler. The grower uses two one-ton flatbed trucks that each alternately holds two pallets at 120 trays per pallet for prompt delivery to the cooler. Trays per pallet will vary by container types. The truck driver takes about one hour per load to deliver the filled trays to the cooler and return to the farm.

Table A. Percent Crop Harvested by Month

	April	May	June	July	Aug	Sept	Oct
Harvest %	5	12	25	25	18	12	3

Yields. Yields for organic strawberries vary depending on season and growing conditions. In this area, yields typically range from 3,500 to 5,000 eight-pound trays per acre. However, some varieties may produce higher yields. This study uses an average yield of 4,250 trays per acre.

Returns. For this study, the estimated unit price to growers for organic strawberries is $13.50 per tray and is based on the 2016 to 2019 Salinas-Watsonville shipping point prices from the USDA Agricultural Marketing Service. Early and late season fruit may be sold at prices that are higher than those sold during the peak harvest months. Estimated net returns to growers for a combination of yields and prices is shown on Table 4, Ranging Analysis. However, prices to growers can vary substantially depending upon market conditions and arrangements and may be even lower or higher than those shown on Table 4.

California Strawberry Commission (CSC) Assessments. The CSC assesses the grower $0.045 per tray to support the commission's goals, which focuses on production and nutrition research, trade relations, public relations, and public policy.

Sales/Marketing. Selling costs for fresh market fruit are calculated as 8% of selling price or $1.08 per tray.

Cooling Costs. Cooling costs vary by cooler and grower volume. Growers are responsible for these costs, which may be negotiable with a cooler. The estimated cost used in this study is $0.85 per tray.

Post-Harvest Cleanup. After all harvest operations have been completed, the plants are mowed. The plastic mulch and drip tape are removed from the field by the grower and hauled to a disposal site. The field is then disked twice in preparation for the next crop.

Labor, Equipment, and Interest

Labor. Labor rates of $22.40 per hour for machine operators and $16.80 for general labor includes payroll overhead of 40%. The basic hourly wages are $16.00 for machine operators and $12.00 for general labor. 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, 2019. Labor for operations involving machinery are 20% 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.

California Minimum Wage and Overtime Rules. In 2016 the California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for 2019 is $12.00 per hour for companies with more than 25 employees and will rise each year by $1.00 per hour until it reaches $15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes; minimum wage rate is $11.00 per hour for 2019 and increases by $1.00 per hour each year until it reaches $15.00 per hour in 2023.

Recent California regulations also decreased the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. Beginning January 2019, for businesses with more than 25 employees, the regulations decreased the overtime threshold for agricultural workers from 60 hours per week and 10 hours per day to 55 hours per week and 9.5 hours per day. In each year following the overtime threshold for agricultural workers decreases by 5.0 hours per week and 0.5 hours per day until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. In January 1, 2019 (2022 for employers with 25 or fewer employees) employees will also be entitled to overtime for 8 hours on the seventh consecutive day of work.

These regulations may cause increased cost of labor used on farms, whether as direct hires, as farm labor contractor employees, or as a component of custom services. For more information and to view the California minimum wage and overtime phase-in schedules visit http://aic.ucdavis.edu/.

Federal H-2A Program. Growers may also choose to use H-2A guestworker visa program to employ workers. Rates of pay are determined by the highest applicable wage rates that are in effect at the time work is performed: the adverse effect wage rate (AEWR), the applicable prevailing wage, the agreed-upon collective bargaining rate, or the Federal or State statutory minimum wage (US Department of Labor). Growers also need to comply with other requirements associated with the H-2A program, including those for housing, meals, transportation. Use of this program 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 6.25 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 in this study is considered a typical lending rate by a farm lending agency as of January 2019.

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 $3.73 (excludes excise taxes) and $3.46 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 excise 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.

Pickup Truck/ATV. This study includes a cost for the use of a pickup truck and ATV for business purposes.

Risk. The risks associated with producing and marketing organic 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 all risks associated with agriculture, including financial, production, market, legal, and human resource risks that ultimately affect the profitability and economic viability of organic strawberries. In this area invasive pests pose particular regulatory and management challenges and increase production and marketing risks for growers. Price uncertainty and variability has also contributed to substantial market risk for growers, especially in recent years. In addition, labor availability and rising wages are noteworthy human resource risks for area growers. Labor constraints have resulted in challenges in hiring a sufficient number of workers to ensure timely and effective farm operations, especially during harvest. Growers report paying higher wages to attract and retain workers; others may pay overtime because of labor constraints. Farm profitability may be negatively impacted under any of these circumstances.

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 on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.886 percent of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $621 for the entire farm.

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 supplies, bookkeeping, accounting, road maintenance, utilities and other miscellaneous expenses.

Land Rent. Land rents in the three-county area range from $450 to $3,300 per acre per year. For this study, land rent is assumed to be $3,000 per 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 see irrigation section for more information).

Organic Certification and Registration Fees. Organic strawberry certification and registration fees are estimated at $204 per acre. This includes fees associated with field inspection, certification, and inspection by a USDA accredited certification agent and the California Department of Food and Agriculture's Organic Program registration fee. Fees will vary from year to year depending upon inspection requirements and product sales.

Food Safety and Regulatory Programs. To ensure the safety of fresh products, accommodate buyer requests, and comply with regulatory programs such as those for water and air quality, growers now have in house departments and/or staff specially dedicated to supervision and management of these programs. Part of a food safety program is participation in third party (independent) audits. Costs associated with food safety programs vary depending upon the farm and inspection circumstances, administrative costs and personnel training and hygiene needs and are 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.

Field Sanitation. Sanitation services provide portable toilets and washing stations to the farm. The cost includes two sets of triple-portable toilets with washbasins, delivery and pickup, and 12 months of servicing. Costs include soap or other suitable cleaning agent, and single use towels. Separate potable water and single use drinking cups are also supplied.

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 $1,250 per acre. Larger operations may have multiple supervisory levels; associated costs will therefore differ.

Non-Cash Overhead

Non-cash overhead, shown on an annual per acre basis, is calculated as the capital recovery cost for equipment and other farm investments.

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 ((Purchase Price – Salvage Value) x (Capital Recovery Factor)) + (Salvage Value x 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 (tractors and implements) 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 for land is the purchase price 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 6.75 percent is used to calculate capital recovery. The rate will vary depending upon size of loan and other lending agency conditions, but is a suggested rate by a farm lending agency in January 2019.

Buildings. The grower maintains a 1,200 square foot metal building on a cement slab.

Fuel Tanks. Two 300-gallon fuel tanks set in containment are installed for equipment fuel.

Tools. This includes shop and field and harvest tools used on the farm. The value is estimated and does not represent any specific inventory.

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 irrigation supplies to and from the field. Main lines above ground are connected to the underground system to deliver water for the irrigations. Additional information about the drip system is located in the production section. The grower owns enough sprinkler pipes to cover 27 acres per setting.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 70 percent to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 5 Whole Farm Equipment, Investment and Business Overhead. 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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CENTRAL COAST - 2019

Table 1. COSTS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Cover Crop (1 per 2 crops)	0 00	0	0	0	0	75	75	
Soil Samples (2 per 27 acres)	0 00	0	0	0	0	11	11	
Subsoil 5X	2 50	56	38	18	0	0	111	
Disk 3X	0 84	19	13	5	0	0	37	
Level (Triplane)	1 00	27	18	8	0	0	53	
Chisel 2X	0 70	16	9	4	0	0	29	
Sprinklers: Setup and Removal	7 80	153	37	13	0	0	204	
Irrigate: Sprinkler	2 65	45	0	0	79	0	123	
Compost + Spread	0 00	0	0	0	275	50	325	
Chisel	0 35	8	4	2	0	0	14	
Beds Listed	1 00	27	18	6	0	0	51	
Pre-plant Fertilizer & Gypsum	0 00	0	0	0	155	30	185	
Beds Shaped	1 00	27	18	6	0	0	51	
Install Drip System, Tape	3 00	99	33	17	1,525	0	1,674	
Plant: Lay Mulch	1 50	40	17	7	363	0	427	
Plant: Punch Planting Holes	0 75	20	8	3	0	0	32	
Plant: Strawberries (7% replants)	52 50	882	0	0	4,661	0	5,543	
Weed: Hand	220 00	3,696	0	0	0	0	3,696	
Insect: Mites (Persimilis)	4 00	67	0	0	520	0	587	
Weed: Cultivate	0 75	20	11	6	0	0	37	
Fertilize: Foliar (Biomin)	0 78	21	12	5	128	0	166	
Fertilize: Foliar (Maxi)	0 78	21	12	5	226	0	264	
Vertebrate Trapping	0 00	67	0	0	0	0	67	
Pest Control Adviser (PCA)	0 00	0	0	0	0	150	150	
Irrigate: Drip	0 00	201	0	0	540	0	741	
Fertigate: Fish Emulsion	0 00	50	0	0	955	0	1,006	
Insect: Vacuum Lygus 8X/month	23.73	638	263	363	0	0	1,264	
Disease: Powdery Mildew (Sulfur)	0 88	24	13	6	75	0	118	
Worms: (Dipel)	0 20	5	3	1	74	0	83	
Insect: LBAM (Entrust)	0 29	8	4	2	228	0	242	
Post-Harvest Cleanup	3 00	492	19	10	18	0	539	
Pickup: Business Use	1 71	46	15	6	0	0	67	
ATV	0 59	16	1	1	0	0	18	
TOTAL CULTURAL COSTS	332.3	6,791	567	495	9,821	316	17,990	
Harvest:								
Harvest: Regular & Peak	0 00	2,165	0	0	6,885	24,438	33,488	
Harvest: Load & Haul	50.00	1,623	216	117	0	0	1,956	
Harvest: Cooler	0 00	0	0	0	0	3,613	3,613	
CSC Assessment	0 00	0	0	0	191	0	191	
Sales / Marketing	0 00	0	0	0	4,590	0	4,590	
TOTAL HARVEST COSTS	50.00	3,788	216	117	11,666	28,050	43,838	
Interest on Operating Capital at 6.25%							1,123	
TOTAL OPERATING COSTS/ACRE	382 3	10,580	783	612	21,488	28,366	62,951	

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CENTRAL COAST - 2019

Table 1. continued. COSTS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

Operation	Equipment Operation Time (Hrs/A)	Cash and Labor Costs per Acre						
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Office Expense							750	
Food Safety							100	
Land Rent							3,000	
Liability Insurance							21	
Sanitation Fee							89	
Regulatory Programs							80	
Organic Certification							204	
Ranch Supervisor							1,250	
Property Taxes							65	
Property Insurance							6	
Investment Repairs							119	
TOTAL CASH OVERHEAD COSTS/ACRE							5,683	
TOTAL CASH COSTS/ACRE							68,635	
NON-CASH OVERHEAD:	Per Producing Acre	Annual Cost Capital Recovery						
Buildings 1,200sqft	1,833	144					144	
Fuel Tanks 2-300gal	366	33					33	
Harvest Carts 70	52	13					13	
75hp Pump and Filter	1,333	121					121	
Sprinkler Pipe	1,481	130					130	
Lateral Lines	444	108					108	
Miscellaneous Tools	500	52					52	
Equipment	5,277	777					777	
TOTAL NON-CASH OVERHEAD COSTS	11,287	1,378					1,378	
TOTAL COSTS/ACRE							70,012	

Note: Growing Costs/Acre = Total Cash Costs/Acre – Harvest Costs/Acre ($68,635 - $43,838 = **$24,797**)

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

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Table 2. COSTS AND RETURNS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Organic	4,250	tray	13.50	57,375	
TOTAL GROSS RETURNS	4,250	tray		57,375	
OPERATING COSTS					
Insecticide:				**821**	
Persimilis (Mite)	80.00	thou	6.50	520	
Dipel DF (Bt)	4.00	lb	18.38	74	
Entrust SC	18.00	oz	12.65	228	
Fungicide:				**75**	
Kumulus DF	45.00	lb	1.67	75	
Fertilizer:				**1,740**	
Compost	5.00	ton	55.00	275	
True Organics 10-5-2	500.00	lb	0.07	35	
True Organics 12-3-0	500.00	lb	0.08	40	
Gypsum	2.00	ton	40.00	80	
Biomin Calcium	8.00	gal	16.00	128	
Maxi-Crop	20.00	lb	11.32	226	
Agrothrive LF	240.00	gal	3.98	955	
Custom/Contract:				**28,366**	
Cover Crop Seed and Planting	1.00	acre	75.00	75	
Soil Analysis	0.07	each	150.00	11	
Pre-plant Fertilizer Application	1.00	acre	30.00	30	
Spread Compost	5.00	ton	10.00	50	
PCA fee	1.00	acre	150.00	150	
Harvest Fresh/Tray	4,250.00	tray	5.75	24,438	
Cooler	4,250.00	tray	0.85	3,613	
Materials:				**8,791**	
T-Tape	21,780.00	foot	0.07	1,525	
Black Plastic Mulch	2.75	roll	132.00	363	
8 Clamshell +Tray	4,250.00	each	1.62	6,885	
Disposal Fees	600.00	lb	0.03	18	
Water:				**619**	
Water Pumped	27 50	acin	22.50	619	
Plants:				**4,661**	
Strawberry Plants	23,305.00	each	0.20	4,661	
Assessment/Sales Commission:				**4,781**	
Strawberry Commission	4,250.00	tray	0.05	191	
Market/Sales Cost	4,250.00	tray	1.08	4,590	
Labor				**10,580**	
Equipment Operator Labor	117.53	hrs	22.40	2,633	
Non-Machine Labor	327.62	hrs	16.80	5,504	
Irrigation Labor	16 52	hrs	16.80	278	
Harvest Labor	128.89	hrs	16.80	2,165	
Machinery				**1,395**	
Fuel-Gas	70 14	gal	3.46	243	
Fuel-Diesel	144.85	gal	3.73	540	
Lube				117	
Machinery Repair				494	
Interest on Operating Capital @ 6.25%				1,123	
TOTAL OPERATING COSTS/ACRE				62,951	
TOTAL OPERATING COSTS/TRAY				15	
NET RETURNS ABOVE OPERATING COSTS				-5,576	

* Peak Harvest Labor Hours/Acre are the equivalent of hourly wage plus piece rate.

Table 2. continued. COSTS AND RETURNS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Office Expense				750	
Food Safety				100	
Land Rent				3,000	
Liability Insurance				21	
Sanitation Fee				89	
Regulatory Programs				80	
Organic Certification				204	
Ranch Supervisor				1,250	
Property Taxes				65	
Property Insurance				6	
Investment Repairs				119	
TOTAL CASH OVERHEAD COSTS/ACRE				5,683	
TOTAL CASH OVERHEAD COSTS/TRAY				1	
TOTAL CASH COSTS/ACRE				68,635	
TOTAL CASH COSTS/TRAY				16	
NET RETURNS ABOVE CASH COSTS				-11,260	
NON-CASH OVERHEAD COSTS (Capital					
Buildings 1,200sqft				144	
Fuel Tanks 2-300gal				33	
Harvest Carts 70				13	
75hp Pump and Filter				121	
Sprinkler Pipe				130	
Lateral Lines				108	
Miscellaneous Tools				52	
Equipment				777	
TOTAL NON-CASH OVERHEAD				1,378	
TOTAL COST/ACRE				70,012	
TOTAL COST/TRAY				16	
NET RETURNS ABOVE TOTAL COST				-12,637	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

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Table 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

	SEP 18	OCT 18	NOV 18	DEC 18	JAN 19	FEB 19	MAR 19	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	Total
Cultural:															
Cover Crop (1 per 2 crops)	75														75
Soil Samples (2 per 27 acres)	11														11
Subsoil 5X	111														111
Disk 3X	37														37
Level (Triplane)	53														53
Chisel 2X	29														29
Sprinklers: Setup and Removal	102	102													204
Irrigate: Sprinkler	81	42													123
Compost + Spread	325														325
Chisel		14													14
Beds Listed		51													51
Pre-plant Fertilizer & Gypsum		185													185
Beds Shaped		51													51
Install Drip System		1,674													1,674
Plant: Lay Mulch		427													427
Plant: Punch Planting Holes		32													32
Plant: Strawberries (7% replants)		5,543													5,543
Weed: Hand				370	370	370	370	370	370	370	370	370	370		3,696
Insect: Mites (Persimilis)						294	294								587
Weed: Cultivate						12	12	12							37
Fertilize: Foliar (Biomin)						21	21	21	21	21	21	21	21		166
Fertilize: Foliar (Maxi)						33	33	33	33	33	33	33	33		264
Vertebrate Trapping						13	13	13	13	13					67
Pest Control Adviser (PCA)	11	11	11	11	11	11	11	11	11	11	11	11	11	11	150
Irrigate: Drip							106	106	106	106	106	106	106		741
Fertigate: Fish Emulsion							127	127	186	127	127	186	126		1,006
Insect: Vacuum Lygus 8X/month								181	181	181	181	181	181	181	1,264
Disease: Powdery Mildew (Sulfur)							13	13	13	26	13	13	13	13	118
Worms: (Dipel)									41	41					83
Insect: LBAM (Entrust)										81		81	81		242
Post-Harvest Cleanup														539	539
Pickup: Business Use														67	67
ATV														18	18
TOTAL CULTURAL COSTS	836	8,131	11	380	380	753	999	886	975	1,009	860	1,001	940	828	17,990
Harvest:															
Harvest								1,685	4,026	8,356	8,356	6,027	4,026	1,011	33,488
Harvest: Load & Haul								116	229	488	488	353	228	53	1,956
Harvest: Cooler								181	434	903	903	650	434	108	3,613
CSC Assessment								10	23	48	48	34	23	6	191
Sales / Marketing								230	551	1,148	1,148	826	551	138	4,590
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	2,221	5,263	10,942	10,942	7,891	5,262	1,316	43,838
Interest on Operating Capital @ 6.25%	4	47	47	49	51	55	60	76	109	171	232	279	-43	-11	1,123
TOTAL OPERATING COSTS/ACRE	840	8,178	57	429	431	808	1,059	3,183	6,346	12,122	12,035	9,170	6,159	2,133	62,951

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
CENTRAL COAST - 2019

Table 3 continued. MONTHLY CASH COSTS PER ACRE TO PRODUCE AND HARVEST ORGANIC STRAWBERRIES

	SEP 18	OCT 18	NOV 18	DEC 18	JAN 19	FEB 19	MAR 19	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	Total
CASH OVERHEAD															
Office Expense	54	54	54	54	54	54	54	54	54	54	54	54	54	54	750
Food Safety								100							100
Land Rent					3,000										3,000
Liability Insurance					21										21
Sanitation Fee					89										89
Regulatory Programs						80									80
Organic Certification														204	204
Ranch Supervisor	89	89	89	89	89	89	89	89	89	89	89	89	89	89	1,250
Property Taxes						33					33				65
Property Insurance						3					3				6
Investment Repairs	9	9	9	9	9	9	9	9	9	9	9	9	9	9	119
TOTAL CASH OVERHEAD COSTS	151	151	151	151	3,261	267	151	251	151	151	187	151	151	355	5,683
TOTAL CASH COSTS/ACRE	992	8,381	209	581	3,692	1,075	1,211	3,435	6,498	12,274	12,222	9,322	6,310	2,488	68,635

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
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Table 4. RANGING ANALYSIS

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

	YIELD (TRAY)						
	3,500	3,750	4,000	4,250	4,500	4,750	5,000
OPERATING COSTS/ACRE:							
Cultural	17,990	17,990	17,990	17,990	17,990	17,990	17,990
Harvest	36,426	38,897	41,367	43,838	46,309	48,779	51,250
Interest on Operating Capital @ 6.25%	1,047	1,072	1,098	1,123	1,149	1,174	1,200
TOTAL OPERATING COSTS/ACRE	55,463	57,959	60,455	62,951	65,447	67,943	70,439
TOTAL OPERATING COSTS/TRAY	15.85	15.46	15.11	14.81	14.54	14 30	14.09
CASH OVERHEAD COSTS/ACRE	5,683	5,683	5,683	5,683	5,683	5,683	5,683
TOTAL CASH COSTS/ACRE	61,147	63,642	66,138	68,635	71,131	73,627	76,123
TOTAL CASH COSTS/TRAY	17.47	16.97	16.53	16.15	15.81	15 50	15.22
NON-CASH OVERHEAD COSTS/ACRE	1,378	1,378	1,378	1,378	1,378	1,378	1,378
TOTAL COSTS/ACRE	62,524	65,020	67,516	70,012	72,508	75,005	77,500
TOTAL COSTS/TRAY	18.00	17.00	17.00	16.00	16.00	16.00	16.00

Net Return per Acre above Operating Costs for Organic Strawberries

PRICE ($/tray)	YIELD (tray/acre)						
Organic Strawberries	3,500	3,750	4,000	4,250	4,500	4,750	5,000
9 00	-23,963	-24,209	-24,455	-24,701	-24,947	-25,193	-25,439
10 50	-18,713	-18,584	-18,455	-18,326	-18,197	-18,068	-17,939
12 00	-13,463	-12,959	-12,455	-11,951	-11,447	-10,943	-10,439
13 50	-8,213	-7,334	-6,455	-5,576	-4,697	-3,818	-2,939
15 00	-2,963	-1,709	-455	799	2,053	3,307	4,561
16 50	2,287	3,916	5,545	7,174	8,803	10,432	12,061
18 00	7,537	9,541	11,545	13,549	15,553	17,557	19,561

Net Return per Acre above Cash Costs for Organic Strawberries

PRICE ($/tray)	YIELD (tray/acre)						
Organic Strawberries	3,500	3,750	4,000	4,250	4,500	4,750	5,000
9 00	-29,647	-29,892	-30,138	-30,385	-30,631	-30,877	-31,123
10 50	-24,397	-24,267	-24,138	-24,010	-23,881	-23,752	-23,623
12 00	-19,147	-18,642	-18,138	-17,635	-17,131	-16,627	-16,123
13 50	-13,897	-13,017	-12,138	-11,260	-10,381	-9,502	-8,623
15 00	-8,647	-7,392	-6,138	-4,885	-3,631	-2,377	-1,123
16 50	-3,397	-1,767	-138	1,490	3,119	4,748	6,377
18 00	1,853	3,858	5,862	7,865	9,869	11,873	13,877

Net Return per Acre above Total Costs for Organic Strawberries

PRICE ($/tray)	YIELD (tray/acre)						
Organic Strawberries	3,500	3,750	4,000	4,250	4,500	4,750	5,000
9 00	-31,024	-31,270	-31,516	-31,762	-32,008	-32,255	-32,500
10 50	-25,774	-25,645	-25,516	-25,387	-25,258	-25,130	-25,000
12 00	-20,524	-20,020	-19,516	-19,012	-18,508	-18,005	-17,500
13 50	-15,274	-14,395	-13,516	-12,637	-11,758	-10,880	-10,000
15 00	-10,024	-8,770	-7,516	-6,262	-5,008	-3,755	-2,500
16 50	-4,774	-3,145	-1,516	113	1,742	3,370	5,000
18 00	476	2,480	4,484	6,488	8,492	10,495	12,500

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ORGANIC STRAWBERRIES - CENTRAL COAST - 2019

Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Total
19	55HP 2WD Tractor	41,000	10	12,111	4,883	24	266	5,172
19	75HP 4WD Tractor	58,000	20	7,442	5,182	29	327	5,539
19	90HP 4WD Tractor	69,000	20	8,853	6,165	34	389	6,589
19	ATV 4WD	8,750	7	3,319	1,223	5	60	1,289
19	Blade Rear 3 pt 8'	1,560	20	81	142	1	8	151
19	Cultivator 3R 12'	9,500	20	495	867	4	50	921
19	Disc-Offset 14'	16,000	20	834	1,460	7	84	1,552
19	Drip Mchne 1-48"R	8,700	15	835	906	4	48	958
19	Lstr/Shpr 3-48"R	5,000	15	480	521	2	27	551
19	Mulch Mchne 1-48"R	3,000	20	156	274	1	16	291
19	Pickup Truck 1/2 T	28,000	5	12,549	4,590	18	203	4,811
19	Punch Mchn 1-48"R	5,000	20	261	456	2	26	485
19	Ripper-5 Shank 18'	10,800	20	563	986	5	57	1,047
19	Sprayer w/20'Boom	3,700	5	1,205	686	2	25	712
19	Trailer-Pipe	1,950	20	102	178	1	10	189
19	Triplane 15'	22,200	20	1,157	2,026	10	117	2,153
19	Truck 1 Ton #1	55,000	8	19,194	7,234	33	371	7,638
19	Mower 4'	3,500	20	182	319	2	18	339
19	Bug Vacuum	35,000	2	16,448	11,336	23	257	11,616
19	Chisel 12'	12,000	20	625	1,095	6	63	1,164
19	Truck 1 Ton #2	55,000	8	19,194	7,234	33	371	7,638
	TOTAL	452,660	-	106,088	57,764	248	2,794	60,805
	70% of New Cost*	316,862	-	74,262	40,435	173	1,956	42,564

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Cash Overhead Repairs	Total
INVESTMENT								
Buildings 1,200sqft	55,000	30	0	4,321	24	275	1,100	5,721
Fuel Tanks 2-300gal	10,975	20	768	997	5	59	220	1,281
Harvest Carts 70	1,400	5	0	339	1	7	22	369
75hp Pump and Filter	40,000	20	2,800	3,632	19	214	800	4,665
Sprinkler Pipe	40,000	15	20,000	3,511	27	300	800	4,638
Lateral Lines	12,000	5	0	2,907	5	60	220	3,192
Miscellaneous Tools	15,000	15	1,500	1,560	7	83	300	1,950
TOTAL INVESTMENT	174,375	-	25,068	17,268	88	997	3,462	21,816

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Office Expense	30.00	acre	750.00	22,500
Food Safety	30.00	acre	100.00	3,000
Land Rent	30.00	acre	3,000.00	90,000
Liability Insurance	30.00	acre	20.70	621
Sanitation Fee	27.00	acre	88.89	2,400
Regulatory Programs	30.00	acre	80.00	2,400
Organic Certification	27.00	acre	203.70	5,500
Ranch Supervisor	30.00	acre	1,250.00	37,500

Table 6. HOURLY EQUIPMENT COSTS

Yr.	Description	Strawberry Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr.
					Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	
19	55HP 2WD Tractor	971	1200	2.85	0.01	0.15	3.66	10.07	13.74	16.76
19	75HP 4WD Tractor	135	600	6.05	0.03	0.38	4.75	13.74	18.49	24 95
19	90HP 4WD Tractor	179	800	5.39	0.03	0.34	4 30	16.49	20.79	26 55
19	ATV 4WD	16	285	3.00	0.01	0.15	1.09	2.31	3.40	6 56
19	Blade Rear 3 pt 8'	28	100	1.00	0.01	0.06	0.00	0.00	0.00	1.06
19	Cultivator 3R 12'	20	100	6.07	0.03	0.35	2 11	0.00	2.11	8.56
19	Disc-Offset 14'	26	100	10.22	0.05	0.59	2.73	0.00	2.73	13 59
19	Drip Mchne 1-48"R	55	100	6.34	0.03	0.33	2 53	0.00	2.53	9 23
19	Lstr/Shpr 3-48"R	54	133	2.74	0.01	0.14	1 14	0.00	1.14	4.04
19	Mulch Mchne 1-48"R	41	100	1.92	0.01	0.11	0 38	0.00	0.38	2.41
19	Pickup Truck 1/2 T	46	400	8.03	0.03	0.35	3.72	8.65	12.37	20.78
19	Punch Mchn 1-48"R	20	100	3.19	0.02	0.18	0.63	0.00	0.63	4.02
19	Ripper-5 Shank 18'	56	125	5.52	0.03	0.32	3.73	0.00	3.73	9 59
19	Sprayer w/20'Boom	79	300	1.60	0.01	0.06	1 17	0.00	1.17	2.84
19	Trailer-Pipe	99	200	0.62	0.00	0.04	0.00	0.00	0.00	0.66
19	Triplane 15'	27	150	9.45	0.05	0.54	3.75	0.00	3.75	13.80
19	Truck 1 Ton #1	760	1000	5.06	0.02	0.26	2 34	4.33	6.67	12.01
19	Mower 4'	10	100	2.24	0.01	0.13	1.70	0.00	1.70	4.08
19	Bug Vacuum	641	750	10.58	0.02	0.24	11 27	0.00	11.27	22 12
19	Chisel 12'	24	75	10.22	0.05	0.59	2.46	0.00	2.46	13 33
19	Truck 1 Ton #2	654	1000	5.06	0.02	0.26	2 34	4.33	6.67	12.01