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

2017

**SAMPLE COSTS TO PRODUCE AND HARVEST
ICEBERG LETTUCE**



CENTRAL COAST REGION

Monterey, Santa Cruz, and San Benito Counties

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Central Coast - Monterey, Santa Cruz, and San Benito Counties**

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INTRODUCTION

The sample costs to produce and harvest iceberg lettuce in the Central Coast Region – Monterey, Santa Cruz, and San Benito 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, but will not apply to every situation. 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 practices, overhead, and calculations are described under assumptions. For additional information or explanation of calculations used in the study, call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-4651, Laura Tourte, UC Cooperative Extension Santa Cruz County (831) 763-8005, Richard Smith, UC Cooperative Extension Monterey County (831) 759-7357, or the local UC Cooperative Extension office.

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 Tables 1 through 6 and pertain to sample costs to produce and harvest iceberg lettuce for the Central Coast Region – Monterey, Santa Cruz, and San Benito Counties. Sample costs are given for tractor, fuel, repairs, labor, materials, and custom services and are based on current figures. *Costs per acre can vary considerably depending upon many variables including individual grower, production location and weather conditions, land rent and taxes, soil type, water costs, pest pressures, material inputs, and energy costs.* For example, lettuce produced in areas with heavy clay soils may have higher land preparation costs per acre than areas with sandy soils. Areas with sandy soils, in turn, will likely have higher water use and irrigation costs per acre than areas with heavy clay soils.

The practices and costs used in this study may not be applicable to all situations or used in each production year. Individual growers may use this study as a template and modify it to more accurately reflect their own situations. Additional iceberg lettuce production information for California is available online from the University of California Division of Agriculture and Natural Resources at: <http://anrcatalog.ucanr.edu/pdf/7215.pdf>. **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 of 1,500 non-contiguous acres of rented land. Roads and buffer zones comprise roughly six percent of the acreage. Iceberg lettuce is planted on 250 acres and rotated with other lettuce and cool season vegetable crops to assist with pest management and soil fertility. Lettuce is planted continuously from late December to mid-August along the Central Coast. Monterey County has a host-free period (December 7 through 21) for management of lettuce mosaic virus (LMV), during which time lettuce may not be planted. Typically, a farm can produce up to two vegetable crops per year on each field. Costs that affect both crops are allocated accordingly. Land rents for row crops range from a low of \$450 to a high of \$3,300 per acre per year in the area. For this study, an annual rental rate of \$2,700 per acre per year is assumed, with \$1,350 allocated to the lettuce crop.

Production Cultural Practices and Material Inputs

Land Preparation. Prior to land preparation, and to help determine fertilization practices, a total of 12 soil samples per 250 acres are taken for analysis. In this study, land preparation is assumed to begin in October and November of the year preceding planting and includes discing (four times), subsoiling (twice), land and laser leveling (once each for every 2 crops). Compost is then custom applied at the rate of four tons per acre (or two tons for the lettuce crop), the acreage chiseled (a total of four times), disced (twice), and beds listed. In January, the beds are cultivated (twice) with a rolling cultivator (Lilliston), and then shaped with a power mulcher.

Plant/Stand Establishment. Iceberg lettuce is direct-seeded using an 80-inch 5-row 3-bed precision air-planter. This study assumes that lettuce is planted in January at the rate of 157,500 seeds per acre using a 2.5-inch in-row spacing and then thinned to a 9-inch in-row spacing approximately 14 to 21 days after planting using an automated thinner; some growers use contract or field labor to perform this operation. The

use of an automated thinner does not reduce the cost of this practice at present but instead allows growers to perform the operation in a timely manner given labor constraints.

Fertilizer/Soil Amendments. In addition to the compost applied during the tillage operations noted above, potassium sulfate is custom applied prior to planting at the rate of 150 pounds per acre. At planting, an anti-crustant (7-7-0-7) is custom applied at the rate of 30 gallons per acre, which supplies 22 pounds of nitrogen (N) to the crop. During the automated thinning process a fertilizer (28-0-0-5) is applied at the rate of 20 gallons or 62 pounds N per acre. A liquid fertilizer (20-0-0-5) is injected into the drip irrigation system once in late February and once in March for a total of 37 gallons per acre or 78 pounds N per acre. A total of 162 pounds of N per acre is applied during the season. The amount of fertilizer used in this study is an average amount; fertilization practices and rates vary and depend soil type, irrigation system, amount of nitrate-N in irrigation water, and quantity of residual soil nitrate-N.

Irrigation. For this study, the estimated cost of pumped water is \$216 per acre-foot or \$18 per acre-inch. Water costs vary considerably in the area depending upon the water district or agency, delivery, associated fees, and pumping variables. Approximately 4 acre-inches of water are applied through sprinklers three times during stand establishment: 3 acre-inches during the first 6 to 10 days after planting and another 1 acre-inch during the week prior to thinning. An additional 10 acre-inches are applied through the drip system during the remainder of the growing season (February, March, and April) for a seasonal total of 14 acre-inches per acre. Labor costs include time to set up and monitor the sprinkler and drip irrigation systems for proper function. Total water use will vary depending upon factors such as irrigation method, soil type, weather, and the time of the year the crop is planted.

Pest Management. Information for specific pest management materials and the associated application rates can be found in the *UC Integrated Pest Management (IPM) Guidelines for Lettuce*. For more information on pest identification, monitoring, and pest management materials, visit the UC IPM website at: <http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html>. Written recommendations are required for many commercially applied pesticides and are made by licensed pest control advisers. For information and pesticide use permits, contact your local county Agricultural Commissioner's office.

Pest Control Adviser/Certified Crop Adviser (PCA/CCA). A PCA/CCA monitors the field for insects, diseases, irrigation, nutrition, and other production needs to determine the necessary management practices. The cost for a PCA in this study is \$30 per acre.

Weeds. The herbicide Kerb is banded (applied to 37.5 percent of the area) immediately after planting. The crop is cultivated (once) at the time of thinning. A second cultivation occurs roughly two weeks after thinning. The beds are hand weeded and doubles are removed approximately three weeks after thinning.

Insects/Diseases. Fields are monitored for a variety of insect pests including aphids, leaf miners, and lepidopterous pests. Three to four pest management applications are typically used during the growing season. Diseases such as downy mildew (pathogen: *Bremia lactucae*) and lettuce drop (pathogen: *Sclerotinia minor*) can cause substantial damage and crop loss in iceberg lettuce production. If disease control is necessary, two to three fungicide applications are used during the season. Because of the variation in insect

and disease pressures from year to year and location to location, costs for a generic pest management program are included in this study.

Harvest. Iceberg lettuce is hand harvested and field packed at crop maturity. The exact timing depends on the variety and time of year planted. Cool season plantings may require up to 100 days to mature, but as the season warms, time to maturity decreases. For this study, a harvest and field packing cost of \$6.00 per 42-pound carton is assumed. Transportation costs vary depending on the distance to market and are included in the above costs. Cooling and palletizing costs an additional \$1.00 per carton, which brings the total harvest cost to \$7.00 per carton. In addition, a sales and marketing cost of \$0.75 per carton is included in this study; this cost may vary from grower to grower.

Yield. Yield is estimated to range from 600 to 1,200 42-pound cartons per acre, with 900 cartons the representative yield used in this study. Each carton contains 24 film-wrapped heads. This pack is only one of several different types that may be used for iceberg lettuce. Actual yield per acre depends upon many variables, including production location, bed width and spacing, season produced (spring or fall crop), field conditions, and pack type and weight.

Returns. Price for iceberg lettuce is estimated to range from \$9 to over \$17 per 42-pound carton with a representative price of \$13.00 per carton in this study. This range reflects the Salinas-Watsonville 2012 to 2016 shipping point monthly averages of the USDA Agricultural Marketing Service. Table 4 provides more information on yield and price ranges, including sample net returns above indicated costs.

Growing Costs. Some growers along the Central Coast of California prefer to focus on growing costs and therefore separate total harvest costs from total cash costs, and 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, Interest, and Equipment

Labor. The labor rates used in this study are \$21.85 per hour for machine operators, \$17.80 for irrigators and \$16.90 for general labor, which includes overhead of 41 percent. The basic hourly wages are \$15.50 for machine operators, \$12.60 for irrigators and \$12.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for truck crops (code 0172), and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers, but for this study the cost is based upon the average industry rate as of January 1, 2017. 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. Growers may already pay wages that are higher than the state's requirement as is shown in this study for 2017. Tables A and B show the phase-in schedules for the new laws.

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

Year	California Minimum Wage	Minimum Wage Increase (%)
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.

[‡] Increase in minimum wage from 2016 to 2017.

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

Year	California Overtime Phase-In Hours Per Week	Overtime Hours/Week [‡]
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 4.50 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 April 2017.

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 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. This study includes a cost for use of a pickup truck for business purposes.

Risk. The risks associated with producing and marketing an iceberg lettuce crop are considered high. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent the production, financial, market, legal, and human resource risks that ultimately affect the profitability and economic viability of fresh market vegetable production. Crop insurance is a risk management tool that growers may use to protect against production related crop loss. 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. Still others employ H-2A workers or hire labor through farm labor contractors. The market for fresh vegetables is volatile for both price and quantity. A market channel should be determined before any lettuce production begins.

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. In most cases costs are apportioned based on the number of crops produced per acre per year.

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 0.846 percent of the average value of the assets over their useful life. Liability insurance covers accidents and other potential farm related liabilities and costs \$20 per acre for each crop.

Office Expense. Annual office and business expenses are estimated at \$700 per acre. Because two crops are produced per acre each year, half of that cost, or \$350 is assumed for the lettuce crop studied here. Costs include, but are not limited to, a variety of administration and office expenses, a ranch supervisor, telephones, supplies, utilities, bookkeeping, and accounting. Some growers have one or more additional sub-foremen for various aspects of their operations. Costs for additional foremen are not included here.

Land Rent. Land rents in Monterey, Santa Cruz, and San Benito Counties range from \$450 to \$3,300 per acre per year. In this study land rent is assumed to be \$2,700 per acre per year or \$1,350 for the lettuce crop. However, rents vary substantially in the area. Land rent includes developed wells and irrigation system. In general, growers in the region 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.

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 and are estimated at \$80 per acre per year or \$40 per acre per crop in this study. In addition, a cost of \$80 per acre per year or \$40 per acre per crop is included for management and compliance with regulatory programs.

Management Salaries. Wages for managers are not included as a cash cost. Any returns above total costs are considered a return to management.

Field Sanitation. Sanitation services for the farm provide portable toilets and washbasins to the farm. The cost includes two double toilets with washbasins, delivery and pickup, and 12 months of weekly servicing. Costs also include soap or other suitable cleansing agent, and single-use towels. Separate potable water and single-use drinking cups are also supplied. Growers using contract labor may not have a separate sanitation cost.

Investment Repair. Repair costs are the annual maintenance costs for investments in non-cash overhead. For this study, annual repairs are calculated as 2 percent of the new cost, with the exception of drip system repairs, which are 5 percent of the total cost and include materials & labor.

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 calculation for 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 (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 equal to 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. An interest rate of 5.00 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2017.

Building. The metal building or buildings are on a cement slab and comprise 2,400 square feet.

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

Fuel Tanks. Two 1,000-gallon fuel tanks, one for diesel and one for gasoline, are on metal stands. The tanks are set up in a cement containment pad that meets federal, state, and county regulations.

Irrigation System/Trailers. The irrigation system is maintained by the landowner and assumed to be included in the land rental cost. The grower invests in and owns sprinkler pipe and drip system materials sufficient for irrigation needs. The grower also owns trailers and 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 fields 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 500-foot well and the grower pays the pumping cost.

Equipment. Farm equipment is purchased when it is both new and used. This study shows the current purchase price for new equipment, which is then adjusted to 70 percent to reflect a mix of new and used equipment. Seventy percent indicates a relatively high percentage of new equipment because of machinery upgrades that are currently necessary to meet air quality requirements. 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 ICEBERG LETTUCE
 Central Coast-2017

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 (12 per 250 Ac)	0.00	0	0	0	0	8	8	
Disc & Roll 4X	1.15	30	40	35	0	0	106	
Sub-Soil 2X	1.02	27	36	32	0	0	95	
Land Plane (1X per 2 Crops)	0.18	5	6	4	0	0	16	
Laser Level (1X per 2 Crops)	0.00	0	0	0	0	83	83	
Compost-Spread (1X per 2 Crops)	0.00	0	0	0	110	20	130	
Chisel 4X	1.42	37	50	43	0	0	130	
Disc & Roll 2X	0.58	15	20	18	0	0	53	
List Beds 3-Row	0.00	0	0	0	0	23	23	
Cultivate-Lilliston 2X	0.40	10	8	7	0	0	26	
Power Mulch/Shape Beds	0.48	13	12	6	0	0	31	
Fertilizer (Potassium Sulfate)	0.00	0	0	0	129	15	144	
Plant/Fertilize (7-7-0-7)	0.57	15	15	18	281	0	329	
Herbicide Application	0.00	0	0	0	92	0	92	
Sprinkler Setup/Irrigate 3X - Establish	5.00	89	0	0	72	0	161	
Cultivate 2X	0.63	17	13	10	0	0	40	
Thin Stand-Automated/Fertilize	0.00	0	0	0	46	115	161	
Disease/Insect Management	0.00	0	0	0	512	60	572	
Drip Setup/Irrigate - Season	8.00	177	34	22	180	0	413	
Fertigate (20-0-0-5) 2X	0.00	0	0	0	64	0	64	
Hand Weed/Remove Doubles 1X	9.52	161	0	0	0	0	161	
PCA/CCA Fee	0.00	0	0	0	0	30	30	
Pickup Truck Use	1.00	26	7	5	0	0	38	
TOTAL CULTURAL COSTS	29.96	622	243	201	1,486	354	2,906	
Harvest:								
Harvest/Field Pack	0.00	0	0	0	0	5,400	5,400	
Cool/Palletize	0.00	0	0	0	0	900	900	
Marketing/Sales Fee	0.00	0	0	0	0	675	675	
TOTAL HARVEST COSTS	0.00	0	0	0	0	6,975	6,975	
Interest on Operating Capital at 4.50%							66	
TOTAL OPERATING COSTS/ACRE		622	243	201	1,486	7,329	9,947	

* A discussion about new labor laws and costs are included on pages 5 and 6 of this study; labor costs may vary substantially from those shown in here.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 1. CONTINUED

Central Coast-2017

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
CASH OVERHEAD:								
Land Rent							1,350	
Liability Insurance							20	
Food Safety Program							40	
Regulatory Program							40	
Office Expense							350	
Field Sanitation							12	
Property Taxes							28	
Property Insurance							2	
Investment Repairs							96	
TOTAL CASH OVERHEAD COSTS/ACRE							1,938	
TOTAL CASH COSTS/ACRE							11,885	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost Capital Recovery				
Shop Building – 2400sqft		48		3			3	
Fuel Tanks - Overhead		7		1			1	
Shop Tools		13		1			1	
Drip System		684		89			89	
Sprinkler System		741		48			48	
Sprinkler Pipe		2,278		131			131	
Equipment		1,899		242			242	
TOTAL NON-CASH OVERHEAD COSTS		5,670		514			515	
TOTAL COSTS/ACRE							12,400	

TOTAL COSTS PER ACRE – HARVEST COSTS PER ACRE = GROWING COSTS PER ACRE

$$\$12,400 - 6,975 = \$5,425$$

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. MATERIAL AND INPUT COSTS PER ACRE TO PRODUCE AND HARVEST ICEBERG LETTUCE
 Central Coast-2017

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Iceberg Lettuce	900	Carton	13.00	11,700	
TOTAL GROSS RETURNS				11,700	
OPERATING COSTS					
Fertilizer:				410	
Compost	2.00	ton	55.00	110	
Potassium Sulfate	150.00	lb	0.86	129	
7-7-0-7	30.00	gal	2.03	61	
28-0-0-5	20.00	gal	2.28	46	
20-0-0-5	37.00	gal	1.73	64	
Custom:				7,329	
Soil Sample	1.00	acre	8.00	8	
Laser Level	0.50	acre	165.00	83	
Haul/Spread Compost	1.00	acre	20.00	20	
List beds 3-Row 80"	1.00	acre	23.00	23	
Ground Application	1.00	acre	15.00	15	
Plant Thinning-Automated	1.00	acre	115.00	115	
Air Application	3.00	acre	20.00	60	
Harvest-Field Pack	900.00	carton	6.00	5,400	
Cool/Palletize	900.00	carton	1.00	900	
Market/Sales Fee	900.00	carton	0.75	675	
PCA/CCA	1.00	acre	30.00	30	
Seed:				221	
Iceberg Lettuce	157.50	thou	1.40	221	
Herbicide*:				92	
Material Cost/Ac				92	
Insecticide*:				282	
Material Costs/Ac				282	
Fungicide*:				230	
Material Costs/Ac				230	
Irrigation				252	
Water-Pumped	14.00	ac in	18.00	252	
Labor**				622	
Equipment Operator Labor	10.51	hrs	21.85	230	
Irrigation Labor	13.00	hrs	17.80	231	
Non-Machine Labor	9.52	hrs	16.90	161	
Machinery				444	
Fuel-Gas	2.00	gal	3.25	7	
Fuel-Diesel	87.61	gal	2.70	237	
Lube				36	
Machinery Repair				165	
Interest on Operating Capital @ 4.50%				66	
TOTAL OPERATING COSTS/ACRE				9,947	

* Pest management programs vary depending on annual production conditions and pest pressure.

** A discussion about new labor laws and costs are included on pages 5 and 6 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 ICEBERG LETTUCE
 Central Coast-2017

	OCT 16	NOV 16	DEC 16	JAN 17	FEB 17	MAR 17	APR 17	Total
Cultural:								
Soil Samples (12 per 250 Ac)	8							8
Disc & Roll 4X	106							106
Sub-Soil 2X	95							95
Land Plane (1X per 2 Crops)	16							16
Laser Level (1X per 2 Crops)	83							83
Compost-Spread (1X per 2 Crops)		130						130
Chisel 4X		130						130
Disc & Roll 2X		53						53
List Beds 3-Row		23						23
Cultivate-Lilliston 2X				26				26
Power Mulch/Shape Beds				31				31
Fertilizer (Potassium Sulfate)				144				144
Plant/Fertilize (7-7-0-7)				329				329
Herbicide Application				92				92
Sprinkler Setup/Irrigate 3X - Establish				107	54			161
Cultivate 2X					40			40
Thin Stand-Automated/Fertilize					161			161
Disease/Insect Management					232	237	103	572
Drip Setup/Irrigate - Season					122	125	166	413
Fertigate (20-0-0-5) 2X					32			64
Hand Weed/Remove Doubles 1X						161		161
PCA/CCA Fee	4	4	4	4	4	4	4	30
Pickup Truck Use	5	5	5	5	5	5	5	38
TOTAL CULTURAL COSTS	316	346	10	740	650	565	278	2,906
Harvest:								
Harvest/Field Pack							5,400	5,400
Cool/Palletize							900	900
Marketing/Sales Fee							675	675
TOTAL HARVEST COSTS	0	0	0	0	0	0	6,975	6,975
Interest on Operating Capital @ 4.50%	1	2	3	5	8	10	37	66
TOTAL OPERATING COSTS/ACRE	318	349	12	745	658	575	7,290	9,947
CASH OVERHEAD								
Land Rent							1,350	1,350
Liability Insurance							20	20
Food Safety Program							40	40
Regulatory Program							40	40
Office Expense	50	50	50	50	50	50	50	350
Field Sanitation	2	2	2	2	2	2	2	12
Property Taxes				14				28
Property Insurance				1				2
Investment Repairs	14	14	14	14	14	14	14	96
TOTAL CASH OVERHEAD COSTS	65	65	65	81	65	65	1,515	1,938
TOTAL CASH COSTS/ACRE	383	414	78	826	723	640	8,806	11,885

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. RANGING ANALYSIS – ICEBERG LETTUCE
 Central Coast-2017

COSTS PER ACRE AND PER CARTON AT VARYING YIELDS TO PRODUCE AND HARVEST ICEBERG LETTUCE

	YIELD (carton/acre)						
	600	700	800	900	1,000	1,100	1,200
OPERATING COSTS/ACRE:							
Cultural	2,906	2,906	2,906	2,906	2,906	2,906	2,906
Harvest	4,650	5,425	6,200	6,975	7,750	8,525	9,300
Interest on Operating Capital @ 4.50%	57	60	63	66	69	72	75
TOTAL OPERATING COSTS/ACRE	7,613	8,391	9,169	9,947	10,725	11,503	12,280
TOTAL OPERATING COSTS/CARTON	12.69	11.99	11.46	11.05	10.72	10.46	10.23
CASH OVERHEAD COSTS/ACRE	1,939	1,939	1,939	1,939	1,939	1,939	1,939
TOTAL CASH COSTS/ACRE	9,552	10,330	11,108	11,885	12,663	13,441	14,219
TOTAL CASH COSTS/CARTON	15.92	14.76	13.88	13.21	12.66	12.22	11.85
NON-CASH OVERHEAD COSTS/ACRE	515	515	515	515	515	515	515
TOTAL COSTS/ACRE	10,066	10,844	11,622	12,400	13,178	13,956	14,733
TOTAL COSTS/CARTON	17.00	15.00	15.00	14.00	13.00	13.00	12.00

Net Return per Acre above Operating Costs for Head Lettuce

PRICE (\$/crtm)	YIELD (carton/acre)						
	600	700	800	900	1000	1100	1200
Iceberg Lettuce							
9.00	-2,213	-2,091	-1,969	-1,847	-1,725	-1,603	-1,480
10.50	-1,313	-1,041	-769	-497	-225	47	320
12.00	-413	9	431	853	1,275	1,697	2,120
13.00	187	709	1,231	1,753	2,275	2,797	3,320
14.00	787	1,409	2,031	2,653	3,275	3,897	4,520
15.50	1,687	2,459	3,231	4,003	4,775	5,547	6,320
17.00	2,587	3,509	4,431	5,353	6,275	7,197	8,120

Net Return per Acre above Cash Costs for Head Lettuce

PRICE (\$/crtm)	YIELD (carton/acre)						
	600	700	800	900	1000	1100	1200
Iceberg Lettuce							
9.00	-4,152	-4,030	-3,908	-3,786	-3,663	-3,541	-3,419
10.50	-3,252	-2,980	-2,708	-2,436	-2,163	-1,891	-1,619
12.00	-2,352	-1,930	-1,508	-1,086	-663	-241	181
13.00	-1,752	-1,230	-708	-186	337	859	1,381
14.00	-1,152	-530	92	714	1,337	1,959	2,581
15.50	-252	520	1,292	2,064	2,837	3,609	4,381
17.00	648	1,570	2,492	3,414	4,337	5,259	6,181

Net Return per Acre above Total Costs for Head Lettuce

PRICE (\$/crtm)	YIELD (carton/acre)						
	600	700	800	900	1000	1100	1200
Iceberg Lettuce							
9.00	-4,666	-4,544	-4,422	-4,300	-4,178	-4,056	-3,933
10.50	-3,766	-3,494	-3,222	-2,950	-2,678	-2,406	-2,133
12.00	-2,866	-2,444	-2,022	-1,600	-1,178	-756	-333
13.00	-2,266	-1,744	-1,222	-700	-178	344	867
14.00	-1,666	-1,044	-422	200	822	1,444	2,067
15.50	-766	6	778	1,550	2,322	3,094	3,867
17.00	134	1,056	1,978	2,900	3,822	4,744	5,667

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ICEBERG LETTUCE
 Central Coast-2017

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
17	205HP Crawler	350,000	10	103,384	37,107	192	2,267	39,566
17	Disc - Offset 25'	48,769	4	17,950	9,589	28	334	9,951
17	Subsoiler - 16'	42,454	5	13,829	7,303	24	281	7,608
17	Triplane - 16'	38,000	10	6,720	4,387	19	224	4,629
17	Chisel - Heavy 26'	51,218	5	16,684	8,811	29	340	9,179
17	Ring Roller-Heavy 18'	15,552	4	5,724	3,058	9	106	3,173
17	Lilliston-Rolling 3-Row	18,000	10	3,183	2,078	9	106	2,193
17	Bed Shaper 3-Row	44,412	15	4,548	4,068	21	245	4,333
17	150HP4WD Tractor	225,000	10	66,461	23,855	123	1,457	25,435
17	Row crop planter	54,887	10	9,706	6,336	27	323	6,687
17	Cultivator 3-Row	9,500	10	1,680	1,097	5	56	1,157
17	Fertilizer Bar 20'	13,000	15	1,331	1,191	6	72	1,268
17	Drip Tape Laying Machine 3-Row	16,117	10	2,850	1,861	8	95	1,963
17	Pickup 3/4 Ton	50,000	5	22,409	7,493	31	362	7,886
17	Saddle Tanks 300gal	1,660	6	479	257	1	11	268
17	Spray Boom 20'	2,900	6	836	448	2	19	469
17	Ring-roller 25'	29,000	4	10,674	5,702	17	198	5,917
17	Drip Tape Extraction Sled	30,000	5	9,772	5,161	17	199	5,376
17	120HP2WD Tractor	136,967	10	40,458	14,521	75	887	15,483
TOTAL		1,177,436	-	338,679	144,322	641	7,581	152,544
70% of New Cost*		824,205	-	237,075	101,025	449	5,306	106,781

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
INVESTMENT								
Shop Building 2400sqft	72,000	30	0	4,684	30	360	1,440	6,514
Fuel Tanks - Overhead	10,975	20	0	881	5	55	220	1,160
Shop Tools	20,000	20	2,000	1,544	9	110	400	2,064
Drip System	341,884	10	0	44,276	145	1,709	17,094	63,224
Sprinkler System	370,495	20	185,247	24,127	235	2,779	7,410	34,551
Sprinkler Pipe	1,139,000	30	569,500	65,522	723	8,543	22,780	97,567
TOTAL INVESTMENT	1,954,354	-	756,747	141,033	1,147	13,556	49,344	205,080

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent	250	acre	1,350	337,500
Liability Insurance	250	acre	20	5,000
Food Safety Program	250	acre	40	10,000
Regulatory Program	250	acre	40	10,000
Office Expense	250	acre	350	87,500
Field Sanitation	250	acre	12	3,000

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. HOURLY EQUIPMENT COSTS FOR ICEBERG LETTUCE
 Central Coast-2017

Yr.	Description	Head Lettuce	Total	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insurance	Taxes	Lube & Repairs	Fuel		
17	205HP Crawler	1197	1600	16.23	0.08	0.99	15.64	32.12	47.76	65.07
17	Disc - Offset 25'	430	500	13.42	0.04	0.47	9.75	0.00	9.75	23.68
17	Subsoiler - 16'	256	400	12.78	0.04	0.49	11.54	0.00	11.54	24.85
17	Triplane - 16'	46	300	10.24	0.04	0.52	6.80	0.00	6.80	17.61
17	Chisel - Heavy 26'	355	400	15.42	0.05	0.59	12.99	0.00	12.99	29.05
17	Ring Roller-Heavy 18'	256	500	4.28	0.01	0.15	2.12	0.00	2.12	6.56
17	Lilliston-Rolling 3-Row	100	200	7.27	0.03	0.37	4.31	0.00	4.31	11.98
17	Bed Shaper 3-Row	121	400	7.12	0.04	0.43	1.20	0.00	1.20	8.78
17	150HP4WD Tractor	653	1600	10.44	0.05	0.64	10.48	23.50	33.98	45.11
17	Row crop planter	144	150	29.57	0.13	1.51	17.57	0.00	17.57	48.77
17	Cultivator 3-Row	158	200	3.84	0.02	0.20	2.27	0.00	2.27	6.32
17	Fertilizer Bar 20'	144	400	2.08	0.01	0.13	0.35	0.00	0.35	2.57
17	Drip Tape Laying Machine 3-Row	188	200	6.51	0.03	0.33	3.86	0.00	3.86	10.73
17	Pickup 3/4 Ton	250	400	13.11	0.05	0.63	5.32	6.50	11.82	25.62
17	Saddle Tanks 300gal	144	250	0.72	0.00	0.03	0.53	0.00	0.53	1.28
17	Spray Boom 20'	144	250	1.26	0.00	0.05	0.92	0.00	0.92	2.23
17	Ring-roller 25'	430	500	7.98	0.02	0.28	3.95	0.00	3.95	12.24
17	Drip Tape Extraction Sled	142	400	9.03	0.03	0.35	7.34	0.00	7.34	16.74
17	120HP2WD Tractor	284	1600	6.35	0.03	0.39	12.70	18.80	31.50	38.28