

## UPDATE OF ALFALFA CUBING COSTS

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**Abstract:** Approximate costs for cubing alfalfa with stationary cubers were developed from production rates, equipment prices and operating costs supplied by a commercial cubing operation in the San Joaquin Valley and two manufacturers of stationary cubing equipment. The maximum output per year for a stationary cuber was assumed to be approximately 12,000 to 14,000 tons. At 12,000 tons per year the cost of the cubing operation alone is \$11.90 per ton. The cost of harvesting and delivering hay to the cuber (swathing, dry chopping and hauling) is nearly the same at \$12.96 per ton. Cube storage, based on storing 50 percent of the total annual production, adds an additional \$4.62 per ton. Total cost for all three operations is \$29.48 per ton. The cost per ton increases as the annual output decreases. At 8,000 tons per year, the total cost per ton is \$33.76 per ton.

**Keywords:** Harvesting, stationary cubing, cube storage, costs.

### INTRODUCTION

UC Leaflet 2276 "Alfalfa Harvesting Costs" was last revised in 1978. The cost information in that publication is no longer valid. In addition, there have been significant changes in cubing practices since that time. Total alfalfa cube production in California has declined, field cubers are no longer manufactured and the number of operating field cubers has decreased. At the same time, the number of stationary cubers has increased, partially offsetting the reduction in output from field cubers.

### COST DATA

The 1987 cost data presented here represents an update of the stationary cubing costs in Leaflet 2276. These costs are based on the following:

- Production rates, equipment prices, and cost data obtained from a commercial cubing operation in the San Joaquin Valley and from two suppliers of stationary cubing equipment.
- An operating season of 6.5 months per year minus 10 to 15 days for bad weather.
- Operating a single 200-hp, stationary cuber 16 hours per day (two 8-hour shifts), 6 days per week at an average production rate of 7 tons per hour.
- A maximum annual output of 12,000 to 14,000 tons per year for a 6.5 month season. This tonnage will vary somewhat from year to year, weather, and other factors. It will also vary somewhat depending upon geographic location.
- A wage rate of \$8 per hour, including fringe benefits.

It should be emphasized that harvesting and cubing costs will vary according to the specific conditions of a given operation. The costs shown here are intended to provide approximate values only.

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The tables and figure below show approximate costs as follows:

- Table 1** Swathing, raking to turn and combine windrows, dry chopping and hauling to the cuber.
- Table 2** Cubing.
- Table 3** Storing and handling the cubes based on storage capacity for 50 percent of annual production.
- Table 4** The total cost per ton for harvesting, cubing and storing alfalfa hay based on 12,000 tons per year output from a single stationary cuber.
- Figure 1** The total costs, as well as the three component costs, and how they are affected by annual tonnage.
- Table 5** The approximate investment in new equipment and facilities for harvesting, cubing and storing alfalfa with a single-unit stationary cuber capable of 12,000 to 14,000 tons maximum output per year.

**Table 1. Cost of harvesting alfalfa and delivering to a station cuber  
Investment and annual overhead costs**

Equipment	No. of items	Price	Life (yrs.)	Depreciation*	Interest†	Other‡	Total Cost
Swather	1	\$ 21,000	3	\$ 6,300	\$ 693	\$ 420	\$ 7,413
Side rakes	2	5,250	5	945	173	105	1,223
Dry hay chopper	1	7,200	3	2,160	238	144	2,542
Tractors	2	100,000	8	11,250	3,300	2,000	16,550
Chopped hay wagons	3	36,500	10	3,285	1,205	730	5,220
Truck to haul wagons	1	16,000	7	2,057	528	320	2,905
<b>Total</b>		<b>\$185,950</b>		<b>\$25,997</b>	<b>\$6,137</b>	<b>\$3,719</b>	<b>\$35,853</b>

**Operating costs**

Operation	Capacity tons/hour	Per hour costs		Total cost	
		Labor†	Fuel and repairs	Per hour	Per ton
Swath	7	\$8.00	\$10.44	\$18.44	\$2.63
Combine windrows	14	8.00	6.95	14.95	1.07
Chop and haul to cuber (2 men)	7	16.00	17.39	33.39	4.77
<b>Total</b>					<b>8.47</b>

**Cost per ton at various annual tonnages**

Tons	Overhead	Operating	Management	Total cost
2,000	\$17.93	\$8.47	\$1.50	\$27.90
4,000	8.96	8.47	1.50	18.93
6,000	5.98	8.47	1.50	15.95
8,000	4.48	8.47	1.50	14.45
10,000	3.59	8.47	1.50	13.56
12,000	2.99	8.47	1.50	12.96
14,000	2.56	8.47	1.50	12.53

\* Depreciation = Price - 10% salvage/yrs. of life.

† Interest = ((Price + 10% salvage) x 6%)2.

‡ Other = Taxes, insurance and housing = Price x 2%.

† Hourly wage rate of \$8 includes benefits.

**Table 2. Cost of cubing alfalfa hay with a stationary cuber**

**Investment and annual overhead costs**

<b>Equipment/ facilities</b>	<b>No. of items</b>	<b>Price*</b>	<b>Life(yrs.)</b>	<b>Depreciation</b>	<b>Interest</b>	<b>Other</b>	<b>Total cost</b>
Paving for cubing and storage, 30,000 sq. ft. of 6" concrete @ 1.50	1	\$45,000	20	\$2,025	\$1,485	\$ 900	\$4,410
Stationary cuber	1	50,000	10	4,500	1,650	1,000	7,150
Electric motor, 200 hp	1	6,500	20	293	215	130	638
Power controls (single unit)	1	15,000	20	675	495	300	1,470
Tractor with loader	1	65,000	10	5,850	2,145	1,300	9,295
Metering box, mixer, and feed conveyor unit	1	45,000	10	4,050	1,485	900	6,435
Conveyor to truck	1	4,300	10	387	142	86	615
Magnets	1	2,500	20	113	83	50	246
Truck and trailer, 5th wheel with live bottom	1	18,000	10	1,620	594	360	2,574
Scales, 30-ton (1/2 share)		<u>20,000</u>	20	<u>900</u>	<u>660</u>	<u>400</u>	<u>1,960</u>
<b>Total</b>		<b>\$271,300</b>		<b>\$20,413</b>	<b>\$8,954</b>	<b>\$5,426</b>	<b>\$34,793</b>

**Operating costs**

	<b>Capacity Tons/hour</b>	<b>Labor</b>	<b>Per hour Electricity and Repairs</b>	<b>Total cost Per hour</b>	<b>Per ton</b>
Cube	7	\$8.00	\$37.48	\$45.48	\$6.50

**Total costs per ton at various tonnages**

<b>Tons</b>	<b>Overhead</b>	<b>Operating</b>	<b>Management</b>	<b>Insurance</b>	<b>Total Cost</b>
2,000	\$17.40	\$6.50	\$1.50	\$1.00	\$26.40
4,000	8.70	6.50	1.50	1.00	17.70
6,000	5.80	6.50	1.50	1.00	14.80
8,000	4.35	6.50	1.50	1.00	13.38
10,000	3.48	6.50	1.50	1.00	12.48
12,000	2.90	6.50	1.50	1.00	11.90
14,000	2.49	6.50	1.50	1.00	11.49

\* Above equipment prices include \$3,500 for electrical wiring and installation costs.  
These calculations are based on a maximum annual production of 14,000 tons for a single cuber.

**Table 3. Cost to store cubes**

**Investment and annual overhead costs**

<u>Equipment</u>	<u>No. of items</u>	<u>Price</u>	<u>Life(yrs.)</u>	<u>Depreciation</u>	<u>Interest</u>	<u>Other</u>	<u>Total cost</u>
Storage shed	1	\$297,500	30	\$ 8,925	\$ 9,818	\$5,950	\$24,693
Tractor & loader	1	20,000	10	1,800	660	400	2,860
Elevator, 60-ft. for loading and piling cubes	1	13,500	10	1,215	446	270	1,931
Scales, 30-ton(1/2 share)		<u>20,000</u>	20	<u>900</u>	<u>660</u>	<u>400</u>	<u>1,960</u>
<b>Total</b>		\$351,000		\$12,840	\$11,584	\$7,020	\$31,444

**Operating costs**

	<u>Costs per ton</u>
Labor	\$0.45
Fuel	0.30
Miscellaneous, electrical power, repairs to shed and equipment	<u>0.75</u>
<b>Total</b>	\$1.50

**Total costs per ton at various annual tonnages**

<u>Tons</u>	<u>Overhead</u>	<u>Operating</u>	<u>Management</u>	<u>Total Cost</u>
2,000	\$15.72	\$1.50	\$0.50	\$17.72
4,000	7.86	1.50	0.50	9.86
6,000	5.24	1.50	0.50	7.24
8,000	3.93	1.50	0.50	5.93
10,000	3.14	1.50	0.50	5.14
12,000	2.62	1.50	0.50	4.62
14,000	2.25	1.50	0.50	4.25

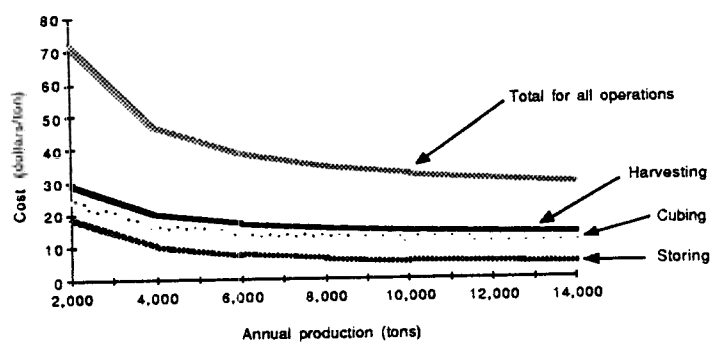
Based on storage handling equipment for maximum of 14,000 tons of cube production per year. Storage shed cost is based on capacity to store 7,000 tons of cubes at one time (35,000 sq ft at \$8.50/sq ft) or 50 percent of maximum annual production.

**Table 4. Cost per ton for harvesting, cubing and storing alfalfa hay with stationary cuber, 12,000 tons production per year**

<u>Operation</u>	<u>Cost per ton</u>
Swath, combine windrows, dry-crop, and delivery to cuber	\$12.96
Cube	11.90
Store	<u>4.62</u>
<b>Total</b>	\$29.48

**Table 5. Investment in equipment and facilities for harvesting, cubing, and storing alfalfa with a single-unit stationary cuber, 14,000 tons maximum output per year**

<u>Equipment</u>	<u>No. required</u>	<u>Investment (\$)</u>
<b>Harvesting and Hauling</b>		
Swather	1	\$ 21,000
Side rakes	2	5,250
Hay chopper, pull-type	1	7,200
Tractors	2	100,000
Chopped hay wagons	3	36,500
Truck to haul wagons	1	16,000
<b>Total</b>		<b>\$185,950</b>
<b>Cubing</b>		
Paving for curing and temporary storage of cubs	1	45,000
Stationary cuber	1	50,000
Electric motor, 200-hp	1	6,500
Power controls (single unit)	1	15,000
Tractor with loader	1	65,000
Metering box, mixer and feed-conveyor unit	1	45,000
Conveyor to truck	1	4,300
Magnets	1	2,500
Truck and trailer, 5th-wheel with live bottom	1	18,000
Scales, 30-ton	1.5 share	20,000
<b>Total</b>		<b>\$271,300</b>
<b>Storage and Handling</b>		
Storage shed, 7,000-ton capacity, 1.5 annual production	1	\$297,500
Tractor and Loader	1	20,000
Elevator, 60-ft, for loading and piling cubs	1	13,500
Scales, 30-ton	1.5 share	20,000
<b>Total</b>		<b>\$351,000</b>
<b>OVERALL TOTAL</b>		<b>\$808,250</b>



**Figure 1. Annual cost per ton for harvesting, cubing, and storing alfalfa (stationary cuber).**