UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2009

SAMPLE COSTS TO HULL AND DRY WALNUTS

North San Joaquin Valley, Sacramento Valley and Lake County

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INTRODUCTION

Sample costs to hull and dry walnuts in northern San Joaquin Valley, the Sacramento Valley and Lake County are presented in this study. The hypothetical facility operation, labor and energy inputs, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589.

Current and many archived Sample Cost of Production Studies for several commodities can be downloaded from the Agricultural and Resource Economics website at UC Davis http://coststudies.ucdavis.edu or obtained from your local UC Cooperative Extension office. These studies as well as other archived studies not on the website can also be requested through the department by calling (530) 752-1517.

ASSUMPTIONS

The following assumptions pertain to sample costs to purchase and operate a well managed walnut hulling and drying facility in Lake County and the Sacramento and northern San Joaquin Valleys. Costs, materials, and practices in this study will not apply to all hulling and drying operations. The study is intended as a guide only.

The information in this study is based on a survey of eleven operations in the study area. Operators provided walnut throughput and cost information for their 2007 and 2008 operating seasons. The operations varied widely in size and seasonal capacity. The smallest operation had a minimum yearly throughput of 79 tons with a dryer capacity of 33 tons. The largest facility handled 8,838 tons in a year with a dryer capacity of 525 tons. Mean seasonal throughput was 1,883 tons with a mean dryer capacity of 133 tons.

Information on huller and dryer capital cost was supplied by a California manufacturer who requested anonymity. Electronic sorter installation and yearly rental costs were provided by Woodside Electronics in Woodland CA.

Facility description. The hypothetical hulling and drying operation has a yearly throughput of 2,000 tons of nuts on a hulled and dried basis. The dryer has a capacity to hold 150 tons of nuts and the huller operates with a capacity of 10 tons per hour and is operated for 10 hours per day. The facility is operated for 40-day period per year, but variation in daily harvest does not allow the facility to operate at full capacity every day. At full capacity the facility could hull and dry 4,000 tons per year. Capital costs for a range of capacities are listed in Table 1.

Table 1. 2009 costs for purchasing and commercially installing a walnut hulling and drying facility

			Costs ($)		
Hulling capacity (tons/hr)	Seasonal Capacity (tons/ season)	Dryer capacity (tons)	Hulling & drying equipment	Building & concrete pad	Total*
5	2,000	100	690,000	350,000	1,040,000
10	4,000	150	1,300,000	550,000	1,850,000
20	8,000	300	1,850,000	850,000	2,700,000

* does not include the cost for connecting to utility

OPERATING COSTS

The hulling equipment and the dryer fans are operated with electric motors and the dryer air is heated with natural gas or propane fuel. The hypothetical dryer is assumed to use the average levels listed in Table 2. Six of the eleven surveyed operations use propane for heating. Dryer fuel use can be reduced by using standard techniques such as recirculating drying air, using in-bin moisture meters to ensure nuts are not over-dried, and shutting off the dryer during the coolest hours of the day. Air recirculation and in-bin moisture meters are used by 82% of the facilities in the survey. Shutting off the dryer is used by 27% of the facilities.

Table 2. Fuel and electricity use for hulling and drying walnuts based on a survey of eleven facilities

	Fuel (therm per ton*)	Electricity (kWh per ton)
Average	12.16	23.6
Range	6.3 – 20.9	13.0 – 42.2

* one therm = 100,000 Btu

It is assumed that the dehydrator is fueled with propane. Price for this fuel has varied considerably over the last five years, based on US DOE Energy Information Agency data. The mean price of commercial propane from 2005 through 2009, is $1.79 per gallon. The price ranges from $1.51 to $2.32 per gallon during the period. Propane has a heat value of 92,000 Btu per gallon, so the mean price per therm equals $1.95. Some facilities have access to natural gas and use this fuel for their dehydrator. Five year average bundled price for gas supplied by the PG&E Co. is $0.94 per therm based on rates for a large commercial customer. The use of natural gas rather than propane decreases fuel cost by 52%.

The average bundled electricity rate for agricultural users in the PG&E service territory in 2009 was $0.142 per kWh based on California CPUC data. The majority of walnut hulling and drying facilities in the study area are PG&E customers for electricity.

Labor cost is dramatically reduced with the use of electronic color sorters, Table 3. Five of the eleven facilities use them. These devices are installed after the huller and automatically remove nuts with adhering black hulls and unhulled nuts. These nuts are recirculated back through the huller to allow complete removal of the hull. This replaces most of the hand sorting labor in the hulling operation.

Table 3. Labor cost for hulling and drying based on a survey of eleven facilities

	With an electronic color sorter ($ per ton)	Without an electronic color sorter ($ per ton)
Average	7.50	31.21
Range	4.60 – 13.60	20.30 – 70.60

The sorters require a capital investment of $14,500 for initial installation and are leased on an annual basis by the operators at an average cost of $11,500 per season.

CASH OVERHEAD COSTS

Property Taxes. Counties charge a base property tax rate of 1% 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% of the average value of the property. Average value equals new cost plus salvage value divided by two.

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 0.82% of the average value of the assets over their useful life. Liability insurance is not included in this study.

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 For this study, we assume that the salvage value for the huller, dryer, and building are zero. Therefore, the formula for the calculation of the annual capital recovery costs is Purchase Price x Capital Recovery Factor).

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

Interest Rate. The interest rate of 4.75% used to calculate capital recovery cost is the suggested basic rate by a farm lending agency as of January 2010. The rate will vary depending upon loan among and other lending agency conditions.

Table 4. Cost of operating a walnut hulling and drying facility without electronic sorting – 2,000 tons throughput

	Quantity	Unit	Price/ Unit	Cost / season	Cost / ton
OPERATING COSTS					
Labor				62,420	31.21
Fuel (propane)	24,320	therm	1.95	47,424	23.71
Electricity	47,200	kWh	.142	6,702	3.35
Repair and maintenance				10,960	5.48
TOTAL OPERATING COSTS				127,506	63.75
CASH OVERHEAD					
Property taxes				9,250	4.63
Property insurance				7,585	3.79
TOTAL CASH OVERHEAD				16,835	8.42
TOTAL CASH COST				144,341	72.17
CAPITAL RECOVERY					
Huller and dryer				82,172	41.09
Building and pad				34,765	17.38
TOTAL CAPITAL RECOVERY				116,937	58.47
TOTAL COST				261,278	130.64

Table 5. Cost of operating a walnut hulling and drying facility with electronic sorting – 2,000 tons throughput

	Quantity	Unit	Price/ Unit	Cost / season	Cost / ton
OPERATING COSTS					
Labor				15,000	7.50
Fuel (propane)	24,320	therm	1.95	47,424	23.71
Electricity	47,200	kWh	.142	6,702	3.35
Repair and maintenance				10,960	5.48
Sorter rental				11,500	5.75
Sorter installation				917	0.46
TOTAL OPERATING COSTS				92,503	46.25
CASH OVERHEAD					
Property taxes				9,250	4.63
Property insurance				7,585	3.79
TOTAL CASH OVERHEAD				16,835	8.42
TOTAL CASH COST				109,338	54.67
CAPITAL RECOVERY					
Huller and dryer				82,172	41.09
Building and pad				34,765	17.38
TOTAL CAPITAL RECOVERY				116,937	58.47
TOTAL COST				226,275	113.14

Table 6. Annual investment costs for huller and dryer

Description	Price	Years life	Annual Costs				
			Capital Recovery	Insurance	Taxes	Repairs	Total
Huller & dryer	1,300,000	30	82,172	4,641	6,500	6,204	99,517
Building & pad	550,000	30	34,765	1,964	2,750	0	39,479
Total	1,850,000		116,937	6,605	9,250	6,204	138,996

Table 7. Annual costs for sorter installation and rental

Description	Cost	Years of Life	Annual Costs		
			Capital Recovery	Annual Rental	Total
Sorter installation	14,500	30	917		917
Sorter rental				11,500	11,500
Total					12,417

Table 8. Cash cost of operating a walnut hulling and drying facility with and without electronic sorting (excluding huller and dryer investment)

	Cost without electronic sorter ($/ton)	Cost with electronic sorter ($/ton)
Labor	31.21	7.50
Sorter installation & rental	-	6.21
Taxes & Insurance	8.42	8.42
Repair & Maintenance	5.48	5.48
Fuel (@$1.95/therm)	23.71	23.71
Electricity (@ $0.142/kWh)	3.35	3.35
total	72.17	54.67

Table 9. Ranging analysis for costs per ton at varying annual throughput without sorter

Tons throughput	1,000	1,500	2,000	2,500	3,000	3,500	4,000
Operating costs	63.75	63.75	63.75	63.75	63.75	63.75	63.75
Cash Overhead	16.84	11.22	8.42	6.73	5.61	4.81	4.21
Total Cash Costs	80.59	74.98	72.17	70.49	69.36	68.56	67.96
Capital Recovery	116.94	77.96	58.47	46.77	38.98	33.41	29.23
Total Costs	197.53	152.93	130.64	117.26	108.34	101.97	97.20

Table 10. Ranging analysis for costs per ton at varying annual throughput with sorter

Tons throughput	1,000	1,500	2,000	2,500	3,000	3,500	4,000
Operating costs	46.25	46.25	46.25	46.25	46.25	46.25	46.25
Cash Overhead	16.84	11.22	8.42	6.73	5.61	4.81	4.21
Total Cash Costs	63.09	57.47	54.67	52.99	51.86	51.06	50.46
Capital Recovery	116.94	77.96	58.47	46.77	38.98	33.41	29.23
Total Costs	180.02	135.43	113.14	99.76	90.84	84.47	79.69

References

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