



2010 Cost Estimates of Producing Pears in North Central Washington

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Preface

Production costs and returns vary greatly for any particular orchard operation due to case-specific:

- Capital, labor, and natural resources
- Crop yields
- Type and size of machinery implements
- Input prices
- Cultural practices
- Commodity prices
- Operation size
- Management skills

Cost estimation also varies with the intended use of the enterprise budget. The information in this publication serves as a general guide for a modern, well-managed winter pear orchard as of 2010. To avoid drawing unwarranted conclusions about any particular orchard or group of orchards, the reader is asked to closely examine the assumptions made and adjust the costs and/or returns as appropriate for the situation.

Pear Production in Washington

Pears are a major tree fruit crop in Washington, with gross sales of about \$251 million for all fresh and processed markets and all varieties produced in the Pacific Northwest (Pear Bureau Northwest, 2010). About 88 percent of the total pear acreage is located in Yakima, Chelan, Okanogan, and Grant counties (U.S. Department of Agriculture National Agricultural Statistics Service (NASS) 2009). The total pear-bearing acreage in Washington has remained generally constant in the past five years, with an average of 24,000 acres (NASS 2010).

The two leading pear varieties are Bartlett and Anjou. Typically in north central Washington, these varieties are grown for the fresh market with specific size, shape, and grade requirements. Table 1 shows the volume of fresh pears produced by variety from 2006 to 2010 (Pear Bureau Northwest 2010). Anjou and Bartlett Pears represent about 85 percent of the state's fresh pear production. Anjou Pears, marketed mainly for the fresh market, are best adapted to cool growing conditions found in the river valleys and higher elevations of the Pacific Northwest. These pears

are harvested in the early fall and stored either in regular refrigerated storage areas for early season marketing or under controlled atmospheric conditions for the winter and spring markets. Bartlett Pears, on the other hand, are harvested in late summer and early fall and marketed for processing and for the fresh market. In this study, we assume that Bartlett Pear trees are planted as pollinating trees among Anjou Pear trees in north central Washington (Hinman et al. 1998).

Study Objectives

The study estimates: (1) the amount required to purchase and operate an existing orchard in terms of equipment, buildings, materials, supplies, and labor; (2) potential returns for an owner-operator with a 20-year planning horizon; and (3) price and yield levels that will make pear production in this orchard a profitable venture.

The data used in this study were gathered from a group of experienced pear growers in north central Washington. Their production practices, input requirements, and views about the latest developments in production methods form the basis for the assumptions in this study.

The data in this publication represent what knowledgeable area growers anticipate over an orchard's life, if no unforeseen failures occur. Additionally, factors not included in this study might alter establishment and production costs, packout, and returns. Individual growers should use the blanks provided on the budget's right-hand column (Table 3) to estimate their own costs and returns.

The primary value of this report is in identifying inputs, costs, and yields considered to be typical of well-managed pear orchards. This publication does not represent a particular operation and is not intended to be a guide to production practices. It describes current industry trends and, as such, can be helpful in estimating the physical and financial requirements of comparable plantings.

Budget Assumptions

1. This budget estimates the costs of purchasing and operating an existing orchard and the potential returns given a 20-year period.

2. The budget and production cost items in Tables 3–8 are based on a 44-acre pear orchard. About 10 percent of the total acreage is dedicated to roads, loading area, irrigation system, and so on. Therefore, the total productive area for this orchard is 40 acres, composed of 30 acres of Anjou Pear trees and 10 acres of Bartlett Pear trees (as pollenizers). The specifications of the pear orchard are listed in Table 2.
3. Expected production is 32 bins (1,100 pounds per bin) per acre. One-fourth of the production, or 8 bins per acre, is Bartlett Pears. Revenue to the grower for both Anjou and Bartlett Pears is estimated at \$250 per bin.
4. The orchard uses a microsprinkler irrigation system. Installation costs \$1,500 per acre, and the water and electricity charges are \$100 per acre and \$20 per acre, respectively. Water is pumped for only 3.5 to 4 months of the year (June to early September).
5. Labor is done by hand and ladder.

Summary of Results

Table 3 shows the requirements and costs for purchasing a 12-year-old pear orchard. The total production cost is estimated at \$9,684 per acre, given the assumptions listed above. Production costs are classified into: *variable costs* that occur only if the crop is produced, e.g., pruning, thinning, materials, harvest, and machinery maintenance and repairs; and *fixed costs*, or costs incurred whether or not pears are grown that include depreciation on capital, interest, taxes, management, pear assessment fee, and other dues.

The net return for a pear grower, given the budget assumptions, is calculated in Table 3. It represents what the owner-operator can anticipate after accounting for all costs, including any labor the owner-operator contributed to crop production and the 7 percent return on investment in the orchard. Breakeven returns to the owner-operator for different enterprise cost levels are presented in Table 4.

The first breakeven return is that required to cover total variable costs. If the breakeven return is greater than the actual returns received, it would be uneconomical to produce pears even in the short run because the added production costs are greater than the added returns. The second breakeven return is that necessary to cover total cash costs, assuming no outstanding loans or land rent. This may be viewed as what is needed to remain financially viable in the short run. The third breakeven return is that required to cover total cash costs and depreciation of machinery and buildings. This value must be realized to stay in business over the long run.

In this example, the third breakeven return is lower than the assumed return of \$250 per bin, which means that the owner-operator can contribute toward his/her opportunity costs from investments in the pear orchard, machinery, equipment, and buildings. However, if the owner-operator

does not account for all opportunity costs in calculating the total cost breakeven return, he/she is jeopardizing profitability relative to alternative uses of resources.

The fourth breakeven return is the *total cost breakeven return*. Only when this breakeven return is received can the owner-operator recover all out-of-pocket expenses plus realize a competitive return on equity capital invested in land, trees, machinery, equipment, and buildings. Failure to obtain this breakeven return level means that the owner-operator will not receive a return on capital contributions equal to what could be earned in alternative uses. A return exceeding the total cost breakeven level means that in addition to covering all cash and opportunity costs, the owner-operator will receive a return on management and on the financial risk assumed in producing pears.

This study provides information about the costs and returns that pear growers in north central Washington can anticipate from owning and operating an orchard consisting of 75 percent Anjou Pears and 25 percent Bartlett Pears in their mature production years. Potential investors using this enterprise budget are asked to carefully examine the assumptions underlying the provided estimates. For instance, two key factors affecting growers' net returns are the annual yield and received prices. Yields vary among different orchards, and pear prices fluctuate from year to year. To further help in analyzing different production scenarios, Table 5 illustrates the potential net returns given various price and yield levels for a fully established pear orchard.

Most of the budget values given in Table 3 are based on more comprehensive underlying information presented in Tables 6 to 9. Annual capital requirements for a 40-acre producing orchard are listed in Table 6. Detailed machinery and building requirements for the entire 44-acre orchard are given in Table 7. Interest costs, detailed in Table 8, assume a 7 percent interest rate. These costs represent: the forgone earnings for investing money in the orchard, equipment, and buildings rather than an alternative activity; and the interest on funds borrowed to finance the orchard's physical capital and operation.

Depreciation costs, given in Table 9, include annual replacement costs of machinery and buildings. Replacement prices may overstate costs growers experience, but they indicate the earnings needed to replace depreciable assets. Depreciation claimed on older purchases, on the other hand, understates the capital required to replace assets, given recent increases in prices paid for machinery and equipment. Therefore, when looking at long-term enterprise viability, it is important to consider the ability to replace depreciable assets on a replacement cost basis.

An Excel® spreadsheet version of the pear budget (Table 3), as well as associated data underlying the per-acre cost calculations (Tables 6–9 and another table with full production costs), is available for download at the Washington State University School of Economic Sciences' Extension website: <http://extecon.wsu.edu/pages/>

Enterprise_Budgets. Growers can change select values and thus use the Excel workbook for collecting and analyzing their own cost data to make informed decisions about cost structures in operating an existing pear planting.

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Table 1. Fresh Pear Production by Variety¹, Washington, 2005-2010

	2005-06	2006-07	2007-08	2008-09	2009-10
Anjou	6,710,026	4,943,120	6,670,206	5,678,498	7,335,265
Bosc	1,466,457	1,384,003	1,483,427	1,479,383	1,549,319
Red Anjou	313,251	352,790	384,389	345,810	474,544
Comice	11,522	9,125	16,565	15,980	27,592
Seckel	6,297	10,948	9,487	13,255	12,945
Other Reds	4,810	0	0	0	0
Other Winter Varieties	60,873	63,308	107,764	82,961	97,372
Green Bartlett	2,341,170	2,089,572	2,572,053	2,426,483	2,653,771
Starkrimson	53,748	57,886	84,224	85,136	94,740
Red Bartlett	101,447	99,357	142,887	87,459	96,217
TOTAL	11,069,601	9,010,109	11,471,002	10,214,965	12,341,765
<i>Anjou and Bartlett as Percent of Total</i>	<i>85.5%</i>	<i>83.1%</i>	<i>85.2%</i>	<i>83.6%</i>	<i>85.6%</i>

Source: Pear Bureau Northwest (2010)

¹Values are reported in 44-pound-box equivalents.

Table 2. Pear Orchard Specifications

Age of the Orchard	12 years old
In-Row Spacing	7 feet
Between-Row Spacing	15 feet
Tree Density	350 trees per acre; 25 percent of the planted trees are pollenizers (Bartlett)
Orchard Size	40 acres

Table 3. Costs and Returns Per Acre of Producing Pears on a 40-Acre Orchard

	Full Production	Your Costs
Estimated Production (bins per acre)		
Anjou	24	
Bartlett	8	
Estimated Price (per bin)	\$250.00	
TOTAL RECEIPTS	\$8,000.00	
Variable Costs (per acre):		
<i>Orchard Activities</i>		
Pruning	\$600.00	
Thinning Bartletts	\$300.00	
Chemical and Fertilizer Application	\$1,200.00	
Beehives	\$100.00	
General Farm Labor	\$850.00	
Irrigation and Electricity Charge	\$106.67	
<i>Harvest Activities</i>		
Picking Labor	\$699.20	
Other Labor (checkers, tractor drivers)	\$352.00	
Hauling Pears	\$100.00	
<i>Maintenance and Repairs</i>		
Machinery Repair	\$293.00	
Fueling and Lubrication	\$140.00	
Irrigation System Maintenance and Repair	\$50.00	
Wind Machine Repair	\$45.00	
<i>Other Variable Costs</i>		
Overhead (5% of variable costs)	\$241.79	
Interest on Variable Costs (7%) ^[1]	\$266.58	
Total Variable Costs	\$5,344.24	
Fixed Costs (per acre):		
<i>Other Fixed Costs</i>		
Land and Property Taxes	\$50.00	
Insurance Cost (on entire farm)	\$420.00	
Management Cost	\$720.00	
Fresh Pear Assessment Fee	\$256.00	
Other Dues ^[2]	\$105.00	
<i>Depreciation</i>		
Irrigation System	\$75.00	
Machinery, Equipment, and Buildings	\$400.00	
<i>Interest</i>		
Land	\$1,260.00	
Machinery, Equipment, and Buildings	\$362.60	
Irrigation System	\$57.75	
Interest on Orchard Investment (7%)	\$633.54	
Total Fixed Costs	\$4,339.89	
TOTAL COSTS	\$9,684.13	
ESTIMATED NET RETURNS	-\$1,684.13	

^[1] Interest expense for three-quarters of a year during full production.

^[2] Includes licenses/subscriptions and accounting fees.

Table 4. Breakeven Return Per Bin to Cover Production Cost

	Cost Per Acre	Breakeven Return Per Bin
1. Total Variable Costs	\$5,344.24	\$167.01
2. Total Cash Costs ^[1] = Total Variable Costs + Land and Property Taxes + Insurance + Fees and Dues	\$6,175.24	\$192.98
3. Total Cash Costs + Depreciation of Irrigation System, Machinery, Equipment, and Buildings	\$6,650.24	\$207.82
4. Total Cost = Total Cash Costs + Depreciation + Interest ^[2] + Management Cost	\$9,684.13	\$302.63

^[1] If there are other cash costs on an individual's orchard, these costs must be identified and included in the cash cost breakeven return calculation.

^[2] Interest costs include some actual cash interest payments.

Table 5. Estimated Net Returns Per Acre at Various Price and Yield Levels^[1]

Yield (bins per acre) ^[1]	Price (per bin)				
	\$200	\$225	\$250	\$275	\$300
20	-\$5,111.05	-\$4,611.05	-\$4,111.05	-\$3,611.05	-\$3,111.05
32	-\$3,284.13	-\$2,484.13	-\$1,684.13	-\$884.13	-\$84.13
40	-\$2,066.18	-\$1,066.18	-\$66.18	\$933.82	\$1,933.82
50	-\$543.75	\$706.25	\$1,956.25	\$3,206.25	\$4,456.25
60	\$978.68	\$2,478.68	\$3,978.68	\$5,478.68	\$6,978.68

^[1] Refers to total yield per acre of Anjou and Bartlett Pears. Assumes a bin size of 1,100 pounds.

Table 6. Summary of Annual Capital Requirements for a 40-Acre Pear Orchard

	Full Production	
	Year 1 ^[1]	Years 2-20 ^[2]
Annual Requirements		
Land ^[3]	\$720,000.00	
Irrigation System	\$60,000.00	
Operating Expenses	\$275,809.49	\$275,809.49
Total Requirements	\$1,055,809.49	\$275,809.49
Receipts	\$320,000.00	\$320,000.00
Net Requirements	\$735,809.49	-\$44,190.51

^[1] Year when the orchard was purchased.

^[2] Corresponds to the assumed 20-year period of owning the orchard.

^[3] Includes trees; excludes buildings.

Table 7. Machinery, Equipment, and Building Requirements^[1] for a 44-Acre Pear Orchard

	Purchase Price	Number of Units	Total Cost
70-Horsepower Tractor	\$32,000	1	\$32,000
55-Horsepower Tractor	\$15,000	1	\$15,000
Four-Wheel Drive ATV	\$3,500	1	\$3,500
Pickup	\$30,000	1	\$30,000
Blast Sprayer	\$18,000	1	\$18,000
Weed Sprayer	\$3,000	1	\$3,000
Fertilizer Spreader	\$2,500	1	\$2,500
Brush Rake	\$4,800	1	\$4,800
Rotary Mower	\$6,000	1	\$6,000
Trailer	\$2,000	1	\$2,000
Backfork	\$200	3	\$600
Front-End Loader	\$5,000	1	\$5,000
Brush Flail	\$8,000	1	\$8,000
Wind Machine	\$25,000	3	\$75,000
Shop Tools	\$5,000	1	\$5,000
Machine Shed and Shop	\$50,000	1	\$50,000
Labor Housing	\$150,000	1	\$150,000
Ladders	\$200	20	\$4,000
Total Cost			\$414,400

^[1] Purchase price corresponds to new machinery, equipment, or buildings.

Table 8. Interest Costs Per Acre for a 40-Acre Pear Orchard

	Total Purchase Price	Salvage Value	Number of Acres	Total Interest Cost	Interest Cost Per Acre
Land ^[1]	\$720,000	\$720,000	40	\$50,400	\$1,260.00
Irrigation System	\$60,000	\$6,000	40	\$2,310	\$57.75
Machinery, Equipment, and Buildings	\$414,400	\$41,440	44	\$15,954	\$362.60
Interest Rate	7.0%				
Salvage Value ^[2]	10.0%				

^[1] Includes trees; excludes buildings.

^[2] Does not apply to land because land is not a depreciable asset (Source: Kay et al., 2007, Farm Management, Sixth Edition).

Table 9. Depreciation Costs Per Acre for a 40-Acre Pear Orchard

	Total Purchase Price	Number of Acres	Total Value Per Acre	Years of Use	Depreciation Cost Per Acre
Irrigation System	\$60,000	40	\$1,500.00	20	\$75.00
Machinery, Equipment, and Buildings ^[1]					\$400.00

^[1] An estimate of average annual replacement costs, rather than depreciation costs, is used for machinery and buildings. Replacement prices may overstate costs fruit growers experience. However, they indicate the earnings needed to replace depreciable assets. When looking at long-term enterprise viability, it is important to consider the ability to replace depreciable assets.



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