

Enterprise Budget

Bush Beans, Processed Market, Willamette Valley, Oregon

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Tim Delbridge, Assistant Professor, Applied Economics

Kristine Buckland, Associate Professor, Vegetable and Specialty Seed Crop Specialist

Nick Andrews, Professor (Practice), Organic Vegetable Extension Specialist

This enterprise budget estimates the typical per-acre costs associated with processed market bush bean production in the Willamette Valley. It was developed through individual consultations with processed vegetable growers in the Willamette Valley, as well as vegetable processors and university experts. The budget is intended to be used as a guide to estimate actual costs and does not represent any specific. The major assumptions used in constructing this budget are discussed below. An attempt has been made to report typical cultural practices used in production of bush beans for the processing market; however, this does not represent the only production method. This baseline budget is accompanied by an Excel file with editable parameters. The reader is encouraged to modify this budget according to their own situation and assumptions to achieve more accurate estimates of enterprise profitability.

Farm Size and Crop Mix: This budget is based on 100 acres of bush bean production on a farm with 400 total tillable acres. Other crops may include squash, sweet corn, and grass seed. Machinery is shared across the farm's crop enterprises, which impacts machinery overhead costs that are attributed to bush bean production. Average bush bean yield is assumed to be 6 net tons per acre at a gross price to the grower of \$315 per ton.

Land and Irrigation: The land is assumed to be leased at a rate of \$250 per acre. Irrigation equipment costs are based on a used system with a \$75 per acre per year repair and maintenance cost. In the baseline budget, the crop is irrigated 9 times during the course of the season, using hand lines, with 1.0 acre-inch applied per watering event. Pumping expenses are based on electricity costs of \$10.00 per acre-inch of water applied during the growing season. Irrigation labor is assumed at a rate of 1.5 hours per acre per watering event to set up and move equipment and lines. Irrigation rates vary considerably based upon soil type, weather, and farm infrastructure. Higher rates may be standard practice within some systems and should be updated in Table 1 of the spreadsheet to reflect individual grower conditions.

Labor: General labor is hired at a rate of \$22.33 per hour, which is based on the 2024 Adverse Effective Wage rate for Oregon plus 16% for labor overhead expenses. Tractor drivers are paid \$22.25 per hour plus 16% for labor for labor overhead expenses for a total of \$25.81 per hour. This budget does not account for the phase-in of required overtime pay for agricultural workers.

Capital: Interest on operating capital (8 percent) is treated as a cash expense. Variable cash expenses are assumed to be borrowed for a 6-month period. Interest on intermediate and long-term capital (8 percent) is treated as a non-cash opportunity cost and categorized as a fixed-cost to machinery ownership.

Machinery and Equipment: The machinery and equipment used in the budget reflect the typical machinery complement for a 400-acre farm growing processed market vegetables in the Willamette Valley.

A detailed breakdown of machinery values is shown in Table 2. Estimated machinery costs are shown in Table 3, assuming straight-line depreciation. The machinery costs are estimated based on the total farm use assumed for the machinery. Table 4 shows the per acre labor, variable, and fixed costs for certain machinery operations, including both the implement and the associated power unit. Fuel prices are assumed to be \$3.50 per gallon for gasoline and \$4.00 per gallon for diesel. Fuel consumption for field operations is assumed to be 0.044 gallons of diesel per horsepower, per hour of use (Lazarus, 2024).



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Repair and salvage value coefficients are taken from the American Society of Agricultural and Biological Engineers (as cited in Edwards, 2015). Complete calculations of machinery ownership and operating costs can be found in the accompanying Excel file.

Operations: The cultural operations are listed approximately in the order in which they are performed. A 225-hp tractor is used to pull the subsoiler and power harrow. A 155-hp tractor is used to pull the disk. A 105-hp tractor is used to pull a flail shredder, and a 67-hp tractor is used for the planter and roller. There are no expenses listed for the purchase of seed or for harvest operations. The seed is provided by the processor and planted by the grower, while harvest is carried out by the processor. Table 1 shows operation rates and units. Pre-plant fertilizer, lime, and pesticide applications are performed as custom applications. The cost of lime application is spread evenly across each crop in the rotation although it would not typically be applied each year. Given the variability of crop protection treatments required across individual farms and years to respond to environmental and pest conditions, average expenditure on chemical inputs were assumed, based on feedback from industry representatives.

Results and Other Notes: Under the baseline set of assumptions, there is an estimated return over cash costs of \$214 per acre and a net return over total economic costs of \$100 per acre. Cash costs include all expenses that would actually be paid out of pocket in the growing year, while economic costs include machinery depreciation and the opportunity cost of capital from machinery and other long-term capital investments. Since we assumed a cash lease for the cropland in this budget, the cash costs are higher than they would be if we assumed that cropland is owned by the farmer. It is important to note that this budget does not include a charge for management time, meaning that although labor is included for machinery operations, no time is budgeted for scouting, decision making, interaction with input suppliers and buyers, managing employees, or time spent to ensure compliance with environmental, food safety, or workplace regulations. Therefore, the net return can be interpreted as a return to management. It is also important to recognize that whole-farm profitability is more complex than the sum of individual enterprise profits. Processed vegetable growers in the Willamette Valley produce a wide variety of different crops, and the planting sequence and the machinery complement required for a given cropping system can interact in ways that impact the agronomic performance as well as the overhead costs incurred by the farm. A whole-farm budget and profitability analysis should be carefully considered before implementing a new production plan.

Break-Even Analysis: Table 5 shows the estimated return over *cash costs* for different levels of yield and price. Table 6 shows the estimated returns over *total economic costs*, which include depreciation and opportunity cost of invested capital. Given the assumptions described above and a yield of 6 tons per acre, the break-even price over total economic costs is \$251 per ton. Assuming a price of \$268 per ton, the yield that achieves a break-even return over cash costs is 5.20 tons per acre. A yield of 5.63 tons per acre would allow break-even on net returns over total costs.

References:

- Edwards, W. 2015. Estimating Farm Machinery Costs. Iowa State University. A3-29. Available at:
<https://www.extension.iastate.edu/agdm/crops/pdf/a3-29.pdf>
- Lazarus, W. 2024. Machinery Cost Estimates. University of Minnesota. Available at:
<https://wlazarus.cfans.umn.edu/william-f-lazarus-farm-machinery-management>

Table 1. Bush Bean, Processed Market, 2024, \$/acre economic costs and returns

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Ton</u>
Bush Beans		6.00	Ton	\$268	\$1,608	\$268
Total gross income					1,608	268
<u>VARIABLE CASH COSTS</u>	<u>Units</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Ton</u>
<i>Field Preparations & Planting</i>						
Lime, custom	1.0 x/acre	6.00	0.00	30.00	36.00	6.00
V-Ripper/Subsoiler	1.0 x/acre	3.97	10.16	0.00	14.13	2.36
Fertilizer, custom	1.0 x/acre	11.85	0.00	105.00	116.85	19.48
Power Harrow	1.0 x/acre	3.58	8.95	0.00	12.53	2.09
Tandem Disc Harrow	1.0 x/acre	2.65	5.64	0.00	8.29	1.38
Row Crop Planter	1.0 x/acre	3.97	4.79	0.00	8.76	1.46
Roller	1.0 x/acre	2.22	1.15	0.00	3.36	0.56
<i>Weed and pest control</i>						
Fungicide, custom	1.0 x/acre	12.00	0.00	175.00	187.00	31.17
Herbicide, custom	1.0 x/acre	12.00	0.00	60.00	72.00	12.00
Insecticide, custom	1.0 x/acre	12.00	0.00	100.00	112.00	18.67
<i>Irrigation</i>						
Labor	9.0 hours	22.33	0.00	0.00	200.97	33.50
Electricity	9.0 acre-inch	0.00	0.00	10.00	40.50	6.75
Maint. & Repairs	1.0 x/acre	0.00	0.00	75.00	75.00	12.50
<i>Post-Harvest</i>						
Flail Shredder	1.0 x/acre	2.53	3.60	0.00	6.13	1.02
Soil Test	1.0 x/acre	0.00	0.00	4.00	4.00	0.67
Tandem Disc Harrow	1.0 x/acre	2.65	5.64	0.00	8.29	1.38
<i>Other Costs</i>						
Pickup and ATV	1.0 x/acre	0.00	12.32	0.00	12.32	2.05
Interest: operating capital	6.0 months				40.08	6.68
Total variable costs		97.75	52.25	559.00	1,109.41	184.90
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Ton</u>
Property insurance				acre	35.00	5.83
Land Charge				acre	250.00	41.67
Total fixed cash costs					285.00	47.50
Total cash costs					1,394.41	232.40
Returns over cash costs					213.59	35.60
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Ton</u>
Machinery and equip - depreciation and interest				acre	99.34	16.56
Pickup & ATV - depreciation and interest				acre	13.81	2.30
Total fixed non-cash costs					113.15	18.86
Total fixed costs					398.15	66.36
Total of all costs per acre					\$1,507.56	\$251.26
Net projected returns					\$100.44	\$16.74

Table 2. Machinery Cost Assumptions

Machine	Size or description	Market value (\$)	Hours or miles of annual use	Expected life (years)	Salvage Value	
					As % of market value	Salvage Value (\$)
Tractor # 1	4WD 225 hp	\$384,230	400	15	16%	61,477
V-Ripper/Subsoiler	14 ft	\$15,000	100	15	29%	4,350
Power Harrow	10 ft	\$13,000	75	15	22%	2,860
Tractor # 2	4WD 155 hp	\$265,600	300	15	16%	42,496
Tandem Disc Harrow	21 ft	\$78,180	75	15	22%	17,200
Tractor # 3	2WD 105 hp	\$133,737	300	15	18%	24,073
Flail Shredder	15 ft	\$40,000	50	15	22%	8,800
Tractor # 4	2WD 67 hp	\$32,574	300	15	18%	5,863
Row Crop Planter	15 ft	\$48,000	50	15	40%	19,200
Roller	12 ft	\$6,000	100	15	40%	2,400
Pickup	3/4 ton 4x4	\$50,000	10,000	10	26%	13,000
ATV	4 wheeler	\$6,000	500	10	26%	1,560

Table 3. Machinery Cost Calculations.

Machine	Size or description	--- Variable costs ---		----- Fixed costs -----		Total Cost
		Fuel & Lube	Repairs & Maint.	Depreciation	Interest	
----- Costs per hour (\$) -----						
Tractor # 1	4WD 225 hp	39.60	23.05	53.79	44.57	161.02
V-Ripper/Subsoiler	14 ft	0.00	3.30	7.10	7.74	18.14
Power Harrow	10 ft	0.00	1.95	9.01	8.46	19.42
Tractor # 2	4WD 155 hp	27.28	15.94	49.58	41.08	133.87
Tandem Disc Harrow	21 ft	0.00	11.73	54.20	50.87	116.80
Tractor # 3	2WD 105 hp	18.48	9.36	24.37	21.04	73.25
Flail Shredder	15 ft	0.00	8.80	41.60	39.04	89.44
Tractor # 4	2WD 67 hp	11.79	0.65	5.94	5.12	23.50
Row Crop Planter	15 ft	0.00	18.72	38.40	53.76	110.88
Roller	12 ft	0.00	0.90	2.40	3.36	6.66
----- Costs per acre (\$) -----						
Pickup	3/4 ton 4x4	7.67	1.92	9.25	3.15	21.98
ATV	4 wheeler	2.19	0.55	1.11	0.30	4.15

Table 4. Estimated Cost of Each Operation with Power Unit.

Operation	Tractor	Field Speed (mph)	Acres per hour	----- Machine costs (\$/acre)-----			Total costs
				Labor costs	Variable costs	Fixed costs	
V-Ripper/Subsoiler	Tractor # 1	4.5	6.5	3.97	10.16	17.43	31.57
Power Harrow	Tractor # 1	7.0	7.2	3.58	8.95	16.06	28.59
Tandem Disc Harrow	Tractor # 2	4.5	9.7	2.65	5.64	20.10	28.39
Flail Shredder	Tractor # 3	7.0	10.2	2.53	3.60	12.38	18.51
Row Crop Planter	Tractor # 4	5.5	6.5	3.97	4.79	15.87	24.64
Roller	Tractor # 4	10.0	11.6	2.22	1.15	1.45	4.81

Table 5. Estimated Per Acre Returns Over CASH Costs at Varying Yields & Prices

Price/Ton	----- Tons per Acre -----						
	4.20	4.80	5.40	6.00	6.60	7.20	7.80
\$195	(575)	(458)	(341)	(224)	(107)	10	127
\$220	(470)	(338)	(206)	(74)	58	190	322
\$245	(365)	(218)	(71)	76	223	370	517
\$270	(260)	(98)	64	226	388	550	712
\$295	(155)	22	199	376	553	730	907
\$320	(50)	142	334	526	718	910	1,102
\$345	55	262	469	676	883	1,090	1,297

Table 6. Estimated Per Acre Returns Over TOTAL ECONOMIC Costs at Varying Yields & Prices

Price/Ton	----- Tons per Acre -----						
	4.20	4.80	5.40	6.00	6.60	7.20	7.80
\$195	(689)	(572)	(455)	(338)	(221)	(104)	13
\$220	(584)	(452)	(320)	(188)	(56)	76	208
\$245	(479)	(332)	(185)	(38)	109	256	403
\$270	(374)	(212)	(50)	112	274	436	598
\$295	(269)	(92)	85	262	439	616	793
\$320	(164)	28	220	412	604	796	988
\$345	(59)	148	355	562	769	976	1,183