

ECONOMIC ANALYSIS OF WINERY BUSINESS OPERATIONS

C.R. Dillon, C. Price, and J.R. Morris

Abstract. *Decision-making guidelines for production and marketing management in small-scale to medium-scale wineries were developed using linear programming models to estimate maximum net returns of six hypothetical wineries. In addition to mastering the art and science of winemaking, a successful winery operator must pay special attention to production and marketing management.*

This research was conducted to provide management guidelines for small-sized to medium-sized wineries typical of Arkansas and the Ozark Region. Linear programming models were used to estimate maximum net returns of six hypothetical wineries with annual fermentation capacities ranging from 100,000 to 5,000 gal. These models reflect an average of data from surveys of Arkansas and Missouri wineries and equipment manufacturers in 1990 and 1991. The results can be generalized to specific wineries, but differences in the actual and model wineries must be carefully considered. For a more detailed discussion of the model and results, see Dillon et al. (1) or Ward (2).

Economic Model. Production of representative varietal wine grapes, grape purchase options, equipment, buildings, and similar production and marketing decisions were included in the model but were limited by technological and economic constraints. For instance, adequate equipment capacity and labor must be present at the appropriate times for winemaking. Technological factors were combined with economic constraints so that potential production and sales were required to lie between pre-selected minimum and maximum percentages of projected volume. It is assumed that location and product quality would be adequate to attract enough customers to achieve specified prices.

Retail prices were discounted by 50% to approximate wholesale prices. In this model, wines are sold on either a four, five, or six year cycle. Sales begin in either the second, third, or fourth season after grapes are produced and the winemaking process is begun.

Vignoles, Vidal, Seyval, Riesling, and Niagara are sold on a four year cycle with 50% sold in year 2, 25% in year 3 and the remaining 25% sold in year 4.

Chardonnay, Chambourcin, and Chancellor are sold on a five year cycle with 50% sold in year 3, and 25% in year 4 and the remaining 25% sold in year 5.

Cabernet and Cynthiana are sold on a six year cycle with 50% sold in year 4, 25% in year 5, and the remaining 25% sold in year 6.

The maximum retail wine sales by annual capacity is 100,000 gal. - 22%; 80,000 gal. - 25%; 40,000 gal. - 40%; 20,000 gal. - 65%; 10,000 gal. - 100%; and 5,000 gal. - 100%.

Table 1. Revenues, Costs, Sales Volumes, and Returns by Winery Size

	Winery Size (Annual Capacity in Thousand Gallons)					
	100	80	40	20	10	5
Revenue						
Retail (\$)	580,053	527,326	421,861	342,754	263,663	131,832
Wholesale (\$)	1,028,289	790,989	316,396	92,286	0	0
Total (\$)	1,608,342	1,318,316	738,257	435,040	263,663	131,832
(\$/GAL)	16.08	16.48	18.46	21.75	26.37	26.37
Costs						
Variable (\$)	1,047,804	861,899	479,611	281,911	177,543	92,644
Variable (% of total)	68.28	68.25	67.50	67.07	71.90	71.36
Fixed (\$)	486,718	401,000	230,951	138,395	69,383	37,175
Fixed (% of total)	31.72	31.75	32.50	32.93	28.10	28.64
Total (\$)	1,534,522	1,262,900	710,561	420,306	246,926	129,820
Net Returns ¹ (\$)	73,820	55,416	27,696	14,734	16,737	2,012
Capital Required (\$)	1,995,105	1,646,895	977,215	601,195	288,590	152,270
Return to Capital (%)	3.70	3.36	2.83	2.45	5.80	1.32

¹Net returns considers all expenses other than inventory and income taxes and include a payment to all capital, labor, and management.

Results. All six of the wineries were estimated to be economically viable. The net returns in Table 1 consider all expenses other than inventory and income taxes in order to reflect the long term equilibrium for a winery that has been in business for at least 6 years. While the 5,000-gal. winery's net returns were only \$2,012 per year, this is reasonably

profitable since personal labor and a 12% opportunity cost of investment capital have been included as expenses. With the exception of the 20,000-gal. winery model, increases in winery size were accompanied by an increasing trend in net returns, demonstrating economies of size. The 10,000-gal. winery displayed the highest rate of return to capital at 5.8% above all expenses. Net returns were highest for the 100,000-gal. winery at \$73,820.

Table 2 presents model results for the 100,000-gal. winery. Smaller wineries would have proportional changes from those presented (80% for the 80,000-gal. winery, etc.). Among white wines, which accounted for 65% of sales, Chardonnay, Vignoles, and Riesling would be produced and sold at the maximum amount permitted. Of the remaining 35% of sales volume (red wine), Cabernet and Chambourcin would be sold at the maximum amount allowed. Approximately 122 acres in owned vineyards would be required to support the 100,000-gal. winery with Niagara and Chancellor being purchased rather than produced.

Table 2. Sales Volumes, Grape Production, Grape Harvest, and Grape Purchase by Variety for the 100,000 Gallon Winery (Year 6 & Beyond)

Varietal	Wine Sales			
	Volume (Gal)	Production (Acres)	Harvest (Tons)	Purchase (Tons)
Chardonnay	10,000 ^a	14.86	60.61	0.00
Vignoles	20,000 ^a	26.77	121.21	0.00
Vidal/Seyval	22,500	27.72	136.36	0.00
Riesling	10,000 ^a	12.44	60.61	0.00
Niagara	2,500 ^b	0.00	0.00	15.15
Total White	65,000	81.78	378.78	15.15
Cabernet	10,000 ^a	14.86	60.61	0.00
Cynthiana	2,500 ^b	4.15	15.15	0.00
Chambourcin	20,000 ^a	21.16	121.21	0.00
Chancellor	2500 ^b	0.00	0.00	15.16
Total Red	35,000	40.17	196.97	15.16
Total	100,000	121.95	575.75	30.31

^aIndicates that the product is sold at the maximum percentage allowed.

^bIndicates that the product is sold at the minimum percentage allowed.

variable aging process, red wines and Chardonnay possess increased storage and interest expenses. Therefore, red wines and Chardonnay displayed greater differences and higher total cost break-even prices than did white wines. Total cost break-even wine prices for the 5,000-gal. and 10,000-gal. wineries demonstrate the need of smaller wineries to emphasize retail sales.

Conclusions. The economic decision-making model of this study makes projections for a long run equilibrium situation. Consequently, the annual net returns and production decisions presented provide insight for a winery that has been operating at least six years. The profits achieved may be economically explained as necessary for overcoming the initial years of business establishment with negative cash flows.

Table 3. Break-even wine price per 750 ml bottle above total/variable costs and retail price.

Wine Type	Winery Size (Annual Capacity in Thousand Gallons)						
	100	80	40	20	10	5	Retail Price ²
Chardonnay	4.08/ 1.73	4.19/ 1.73	4.69/ 1.74	5.50/ 1.74	6.42/ 1.76	6.75/ 1.77	7.85
Vignoles	3.48/ 1.35	3.58/ 1.35	4.04/ 1.35	4.78/ 1.36	5.61/ 1.38	5.91/ 1.38	7.50
Vidal/Seyval	3.40/ 1.27	3.50/ 1.27	3.95/ 1.27	4.69/ 1.27	5.53/ 1.29	5.83/ 1.30	6.20
Riesling	3.64/ 1.51	3.75/ 1.51	4.20/ 1.51	4.94/ 1.52	5.77/ 1.54	6.07/ 1.54	5.30
Niagara	3.21/ 1.08	3.31/ 1.08	3.76/ 1.08	4.50/ 1.08	5.34/ 1.10	5.63/ 1.11	4.10
Cabernet	4.52/ 1.94	4.65/ 1.94	5.19/ 1.94	6.09/ 1.95	7.10/ 1.97	7.46/ 1.98	9.00
Cynthiana	3.69/ 1.34	3.80/ 1.34	4.30/ 1.34	5.11/ 1.35	6.03/ 1.37	6.35/ 1.38	6.50
Chambourcin	3.70/ 1.35	3.81 / 1.35	4.31 / 1.35	5.12/ 1.36	6.04/ 1.38	6.36/ 1.39	6.00
Chancellor	4.26/ 1.68	4.38/ 1.68	4.93/ 1.68	5.82/ 1.68	6.83/ 1.71	7.19/ 1.72	5.00

¹For the purpose of this table, variable costs include cost of grapes (the lesser of variable production costs or purchase price), wine taxes, glass, labels, corks, yeast, and utilities.

²Wine prices are from May 1991 and May 1992 surveys of Arkansas and Missouri winery managers.

LITERATURE CITED

1. Dillon, C.R., J.R. Morris, C. Price, D. Ward, and D. Metz. "Economic Considerations for Small-Sized to Medium-Sized Wineries." Wine East: 1992 Buyer's Guide. 1992, p. b-23.
2. Ward, D. Planning Guidelines for Small and Medium Sized Wineries/ Juice Plants in Arkansas. Unpublished Masters Thesis. 1991. Department of Agricultural Economics and Rural Sociology, University of Arkansas.