

## JUICE PRODUCTION ECONOMICS IN SMALL TO MEDIUM SIZED WINERIES

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**Abstract.** *An economic analysis of grape juice production by wineries ranging in capacity from 5,000 to 100,000 gallons of wine annually found that juice production at 5% of winery capacity could be a profitable supplement for wineries in the 10,000- to 100,000gallon range.*

Grape juice production offers potential for supplementing profits of existing winemaking facilities. Therefore, the economic feasibility of adding the equipment required for grape juice production to an existing winery was analyzed. The analysis expands upon the results of earlier studies of the business operations of small- to medium-sized wineries (1). Arkansas's major grape cultivars were incorporated into the previous winery decision making model (1) to examine juice production. Additional investment needed for cold press juice processing by wineries with 5,000 to 100,000 gallons of fermenting capacity is \$18,250 to \$48,750 for pasteurization equipment. The cost of a small heat exchanger was added for hot press juice processing, adding \$2,750 to \$6,250 for the same winery capacities. Hot pressing requires heating the grapes and holding them in the presence of pectolytic enzymes before pressing. This process will produce up to 200 gallons of juice per ton of grapes. Cold pressing grapes will yield 160 to 170 gallons of juice per ton.

Depreciation was computed over 15 years for juice equipment using a zero salvage value and the straight-line method. Retail sales percentages for each juice cultivar follows the same minimum and maximum percentages of total sales volume as wine (1).

Juice was set at a retail price of \$3 and a wholesale price of \$1.50 per 750-ml bottle based on expert opinion and informal surveys. The maximum volume of juice sales assumed 5% of annual fermentation capacity as determined by information from limited numbers of existing winery/juice plant processors.

**Costs and Returns.** As indicated in Table 1, the hot press juice technology (at 195 gal of juice per ton of grapes) is profitable as a supplementary enterprise at all wineries except the 5,000 gal size. For the 100,000-gal winery, net returns increased by \$10,606 from juice sales. The cold press juice technology adds relatively more to profits for the 10,000- to 40,000-gal wineries because it avoids the additional costs of hot press processing. The 10,000-gal winery displays the greatest return to capital because of the necessity to shift from labor intensive to capital intensive strategies when expanding capacity and the ability of smaller wineries to utilize retail sales exclusively.

**Production Decisions.** Production decisions for each cultivar are found for the 100,000gal winery in Table 2. While total wine and juice sales are the same for the two production technologies, greater grape requirements accompany cold press juice processing as evidenced by greater grape harvests and purchases. Cold pressing required 638 tons of grapes annually for both wine and juice production while hot press required 632 tons of grapes.

There was a reversed trend in economically desirable cultivars used for wine and juice. The premium, higher priced wines ('Chardonnay', 'Vignoles', 'White Reisling', 'Cabernet Sauvignon' and 'Chambourcin') were generally produced and sold at the maximum allowed in the model. However, the lower cost grapes ('Niagara', 'Concord', 'Chancellor' and 'Chambourcin') were the most profitable sources for juice production because all juices in the model sold for the same price per bottle. Ultimately, the gross margin per bottle (price minus cost of production) determines the relative profitability of a given cultivar and depends primarily upon marketability (product demand), grape yields and grape prices.

**Breakeven Price.** Estimates of the breakeven price per 750 ml bottle of hot press juice are presented in Table 3 by cultivar. The model projects considerable differences in breakeven prices above variable costs between juice varieties. There is a range between \$0.61 for Concord and \$1.06 for Cabernet juice at the 100,000-gal winery. These differences are attributable to differences in grape prices and grape yields per acre. The advantage of Concord juice for profitability is evidenced by a lower total costs breakeven price. While the breakeven prices for Concord can vary considerably across winery sizes because of differing equipment costs, it is the lowest cost and thus highest profit juice. While net returns reflect all costs, breakeven prices include additional juice line equipment but exclude other items already present at the existing winery for winemaking (e.g. crushing and receiving equipment; full-time cellar workers, etc.).

Grape juice processing may utilize otherwise unused resources such as slack labor and equipment capacity. Thus, excess equipment and full time employees inherent to the fixed structure of the firm can be more fully used. Juice production has the advantage of more immediate sales relative to winemaking, which can help improve cash flows. However, the potential marketability of grape juices needs to be considered. Additional grape requirements also are a relevant concern,

Marketing logistics complement adding juice production to the winery. A larger customer base might be encouraged from the inclusion of grape juice products. Additionally, a winery can market grape juice as a specialty item in a 750-ml wine bottle, which has traditionally resulted in being able to command better prices as opposed to a mass-market

**Table 1. Revenues, costs, sales volumes and returns by winery size for hot and cold press juice.**

Item <sup>1</sup>	Winery Size (Annual Fermenting Capacity in Thousand Gallons)					
	100	80	40	20	10	5
<b>Hot Press</b>						
Total Revenue (\$)	1654092	1355816	759257	447415	271163	135582
Variable Cost (\$)	1071382	880895	489527	287228	180395	94251
Variable Cost (% of TC)	68.26	68.18	67.20	66.48	70.98	69.42
Fixed Cost (\$)	498284	411080	238883	144841	73743	41525
Fixed Cost (% of TC)	31.74	31.82	32.80	33.52	29.02	30.58
Total Cost (\$)	1569666	1291974	728411	432069	254137	135777
Net Returns (\$)	84426	63842	30846	15346	17026	-195
Capital Required (\$)	2050105	1694895	1015215	632195	309590	173270
Returns to Capital (%)	4.12	3.77	3.04	2.43	5.50	-0.11
Change from No Juice Net Returns (\$)	10606	8425	3151	612	288	-2207
<b>Cold Press</b>						
Total Revenue (\$)	1654092	1355816	759257	447415	271163	135582
Variable Cost (\$)	1073430	882541	490313	287613	180564	94314
Variable Cost (% of TC)	68.35	68.27	67.32	66.59	71.16	69.72
Fixed Cost (\$)	497037	410186	237971	144282	73179	40960
Fixed Cost (% of TC)	31.65	31.73	32.68	33.41	28.84	30.28
Total Cost (\$)	1570467	1292726	728285	431894	253744	135273
Net Returns (\$)	83625	63089	30972	15521	17420	309
Capital Required (\$)	2043855	1690395	1010715	629445	306840	170520
Returns to Capital (%)	4.09	3.73	3.06	2.47	5.68	0.18
Change from Hot Press Net Returns (\$)	-800	-752	126	174	394	504
Change from No Juice Net Returns (\$)	9805	7673	3277	787	682	-1703

<sup>1</sup> TC = total cost.

**Table 2. Sales volumes by cultivar for the 100,000-gallon winery.**

Cultivar	Wine Sales Volume (Gal)	Juice Sales Volume (Gal)
Chardonnay	10000 <sup>a</sup>	125 <sup>b</sup>
Vignoles	20000 <sup>a</sup>	500 <sup>b</sup>
Vidal & Seyval	22500	1000
Relisng	10000 <sup>a</sup>	125 <sup>b</sup>
Niagara	2500 <sup>b</sup>	500 <sup>a</sup>
Total White	65000	2250
Cabernet	10000 <sup>a</sup>	125 <sup>b</sup>
Cynthiana	2500 <sup>b</sup>	125 <sup>b</sup>
Chambourcin	20000 <sup>a</sup>	1000 <sup>a</sup>
Chancellor	2500 <sup>b</sup>	500 <sup>a</sup>
Concord	0 <sup>b</sup>	1000 <sup>a</sup>
Total Red	35000	2750
Total	100000	5000

<sup>a</sup> Sold at maximum percentage allowed within the model.

<sup>b</sup> Sold at minimum percentage allowed within the model.

**Table 3. Breakeven hot press juice price per 750-ml bottle above total/variable costs by variety and winery size.**

Juice Type	Winery Size (Annual Fermenting Capacity in thousand gallons)					
	100	80	40	20	10	5
	TOT/VAR	TOT/VAR	TOT/VAR	TOT/VAR	TOT/VAR	TOT/VAR
Chardonnay	1.67/1.04	1.72/1.04	2.05/1.04	2.62/1.04	3.15/1.05	5.03/1.05

Vignoles	1.51 /0.87	1.55/0.87	1.88/0.87	2.45/0.88	2.98/0.88	4.87/0.89
Vidal&Seyval	1.44/0.81	1.49/0.81	1.82/0.81	2.39/0.82	2.92/0.82	4.80/0.82
Riesling	1.62/0.99	1.67/0.99	2.00/0.99	2.57/1.00	3.10/1.00	4.98/1.00
Niagara	1.30/0.67	1.35/0.67	1.68/0.67	2.25/0.68	2.78/0.68	4.66/0.68
Cabernet	1.69/ 1.06	1.74/ 1.06	2.07/ 1.06	2.64/ 1.07	3.17/ 1.07	5.05/ 1.07
Cynthiana	1.41/0.77	1.46/0.77	1.79/0.78	2.36/0.78	2.89/0.78	4.77/0.79
Chamborcin	1.42/0.78	1.46/0.78	1.79/0.78	2.36/0.79	2.89/0.79	4.78/0.80
Chancellor	1.53/0.90	1.58/0.90	1.91 /0.90	2.48/0.90	3.01 /0.91	4.89/0.91
Concord	1.25/0.61	1.30/0.61	1.63/0.62	2.19/0.62	2.73/0.62	4.61 /0.63

Notes: For the purpose of this table, variable costs include cost of grapes (the lesser of production costs or purchase price), glass, labels, corks and utility expenses used in producing and bottling juice in a wine bottle.

product. A limited amount of a quality juice product can be marketed in the tasting room and to outlets such as restaurants in the same avenue (with similar marketing costs) as wine to command a higher price than mass grocery sales of juice.

**Conclusions.** The results demonstrate that, for all but the 5,000-gal winery, grape juice production can be a positive supplement to income at the assumed 5% of capacity. The results also demonstrate the desirability of hot press technology for juice volumes greater than 4,000 gal annually (associated with the 80,000-gal winery). For these volumes, the cost of a small heat exchanger was justified through increased juice extraction. Cold press juice technology with lower investment costs was more profitable for the wineries that had juice production of 2,000 gallons or less.

#### LITERATURE CITED

1. Dillon, C.R., C. Price and J. Morris. An economic analysis of business operations in small-to medium-sized wineries. AFR 42(2):8-9.